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KHUDYNA (I. P.). Вирусные болезни Табака в СССР. [Virus diseases of Tobacco in the U.S.S.R.]—*Всесоюзн. научно-исслед. Инст. Табачн. Махорочн. Пром. им. А. И. Микояна* (*ВИТИМ*) [*The A. I. Mikoyan Pan-Soviet sci. Res. Inst. Tob. and Indian Tob. Ind.* (*VITIM*)], Krasnodar, *Publ.* 130, 79 pp., 13 figs., 1936. [English summary.]

After a cursory review of the recent developments in the study of tobacco virus diseases in other countries, a detailed and fully tabulated account is given of investigations, at the Mikoyan Tobacco Research Institute at Krasnodar (north Caucasus) from 1932 to 1935, on those that occur in the tobacco-growing areas of the Crimea and of the Russian south-eastern and Caucasus littoral of the Black Sea.

Tobacco mosaic is practically co-extensive with the crop, and in certain years and localities considerably lowers both the quantity and the quality of yield. Three types of the disease are recognized, closely corresponding to Johnson's severe mosaic types 1 and 2 and mild mosaic type 1 [*R.A.M.*, x, p. 60]. The facts, however, that the symptom expression varied very considerably and that the inoculum could produce the symptoms of any one of the three types, renders it very probable that the disease is really caused by a single virus, which by its pathogenic, physical, and chemical properties appears to be closely related to, if not identical with, Johnson's tobacco virus 1 [ibid., xv, p. 532]. The virus was found experimentally to persist in dry leaves over a period of 4 years, in roots in the soil for 215 days, in processed tobacco for more than a year, in fresh juice treated with 50 per cent. alcohol or nitric acid (1 in 200) for 24 hours, and in decomposing juice for more than 83 days. Special tests showed that while tobacco seed does not in itself carry the mosaic, the dust and vegetable débris with which it is usually mixed often contain infective material, from which the developing seedlings may be infected. In the field infection also frequently occurred when tobacco seedlings or plants were shaded with mats on which, during the winter, mosaic diseased tobacco leaves had been spread after fermentation. Immunity experiments so far have failed to give entirely positive results with any of the varieties of *Nicotiana tabacum* or their hybrids with other species which were used, but in 1934 five lines of a *N. glutinosa* × Dubeck 44 (*N. tabacum*) cross when inoculated with the mosaic only developed local lesions, all

the leaves developing after infection remaining normal, and the mosaic virus being shown to be only present in the inoculated leaves. In the Azoff–Black Sea region isolated tobacco plants were observed to be affected with a peculiar form of mosaic, characterized by scarcely perceptible variegation of the leaves, which were narrowed, especially in the distal half, to almost lanceolate form. This disease has not yet been investigated.

'Pestritza' [speckling], the symptoms of which closely resemble those of the American speck spot [ibid., xii, p. 205], also occurs wherever tobacco is grown. Two forms of the disease are distinguished, namely 'white pestritza', in which the lesions first develop as small chlorotic rings or arcs, inside which the tissues eventually die and become white but do not fall out; and 'brown pestritza', in which the lesions first appear as brown or dark brown necrotic spots, surrounded by a halo; the spots gradually increase in size and may reach up to 2 or 3 mm. in diameter; when fresh the spots are distinctly zonate but later the zonation usually disappears. In number the spots vary from a few to very numerous, involving well over one half of the leaf blade. Of all the transmission methods tested, only successful grafting with diseased scions gave positive results. Infection was demonstrated to be carried by seed from diseased plants, and preliminary tests indicated that the disease may be controlled by dry heating of the seed at 90° to 95° C. for one hour; these high temperatures did not unduly lower the germinability of the seed, but delayed the emergence of the seedlings by 13 to 14 days.

Virescence or female sterility of the tobacco is known locally under the name 'montar', and was shown by Ryjkoff to be caused by the virus of tomato 'stolbur' [ibid., xiv, p. 131; xv, p. 182]. It was experimentally demonstrated that the disease is not transmissible with the expressed juice from diseased plants but can be transmitted by successful grafting with diseased scions or buds; seed occasionally produced by 'montar' tobacco was also shown not to carry the virus. Field observations indicate that the disease is distributed by some insect, and that *Convolvulus arvensis* and *Atropa belladonna* are probably the source of field infections. The leaves of 'montar' plants are thick, coarse to the touch, and brittle; they dry with difficulty, and are greatly predisposed after curing to moulding and rotting, this condition in mixed leaf bales readily spreading to healthy tobacco; for this reason 'montar' leaves should never be packed with the healthy leaves.

The other tobacco virus diseases discussed comprise ring spot [ibid., xv, p. 533], the mild, severe, and coarse types of etch [ibid., xiv, p. 685], streak [ibid., xv, p. 535], and leaf curl or kroepoek [ibid., xv, p. 118]. In addition brief notes are given on four other virus diseases on tobacco, which have not been yet studied.

STANLEY (W. M.). **The inactivation of crystalline Tobacco-mosaic virus protein.**—*Science*, N.S., lxxxiii, 2165, pp. 626–627, 1936.

Treatment of the crystalline tobacco mosaic virus protein [*R.A.M.*, xv, p. 611] with hydrogen peroxide, formaldehyde, nitrous acid, or ultra-violet light has been found to produce inactive native proteins with certain chemical and serological characteristics of the virus protein.

These proteins do not, however, cause mosaic disease or the production of a high molecular weight protein on inoculation into Turkish tobacco, nor does *Nicotiana glutinosa* respond to infection by the development of local lesions. The solutions of the inactive proteins are more opalescent than those of the active type and they tend to denature more readily. On inactivation by nitrous acid the protein possesses a considerably lower laevo-rotation than before treatment. The isoelectric point [ibid., xv, p. 531] of protein inactivated with formaldehyde or nitrous acid is shifted towards the acid side, while that treated with ultra-violet light or hydrogen peroxide remains almost unchanged. Microscopically the crystals of the inactive proteins are indistinguishable from those of the active.

In a typical experiment, inactivation of a 1 per cent. solution of virus protein occurred after five hours' standing at 27° C. with 5 per cent. formaldehyde or hydrogen peroxide at P_H 7 or with 2 per cent. sodium nitrite at P_H 3. The treatments reduced the amino-nitrogen content of the protein by 60, 60, and 99 per cent., respectively. Inactivation of a 0·5 per cent. solution followed eight hours' irradiation with the full light of a laboratory mercury vapour lamp.

The sera of animals injected with virus preparations give a precipitate when mixed with a solution containing only 10^{-5} gm. per c.c. of inactive protein, and the serum of an animal injected with a solution of inactive protein gives a precipitate when mixed with solutions containing only 10^{-5} gm. per c.c. of either active or inactive protein. Caution is therefore indicated in the use of precipitin reactions as an index of virus activity [ibid., xv, p. 242], there being no correlation in the case of inactive protein between precipitin titre and virus activity.

Vigorous treatment of the virus protein involving, for instance, denaturation by means of acids, alkalis, or heat, oxidation with potassium permanganate, chromic acid, or chloramine-T causes the loss not only of virus activity, but also of the characteristic properties of the protein. On the other hand, the use of formaldehyde, hydrogen-peroxide, nitrous acid, or ultra-violet light appears to cause only slight changes in the protein molecule. However, since virus activity is evidently a specific property of the high molecular weight protein, even such minor alterations as result from relatively mild treatments may suffice to cause loss of capacity for infection of susceptible plants.

McDonald (W. J. B.). **Blue mould in Tobacco. Trial of New Zealand seedlings.**—*J. Dep. Agric. Vict.*, xxxiv, 1, pp. 19–21, 32, 2 figs., 1936.

Since no part of Victoria is free from infection by tobacco blue mould [*Peronospora tabacina*: *R.A.M.*, xv, p. 612], it was decided to explore the practicability of raising seedlings in New Zealand, where the disease is unknown, for transhipment to the State. Details are given of experimental consignments, the growth of which so far is stated to be satisfactory.

McDonald (W. J. B.). **Tobacco investigations in Victoria. The efficacy of various fungicides.**—*J. Dep. Agric. Vict.*, xxxiv, 6, pp. 290–291, 315, 1 fig., 1936.

In spraying tests conducted at Shepparton, Victoria, in 1935 by

M. J. Cannon and W. T. Prowd against tobacco blue mould [*Peronospora tabacina*: see preceding and next abstracts] colloidal sulphur 0·1 and 0·4 per cent., and 0·4 per cent. plus malachite green 1 in 10,000, gave no measurable degree of protection. Very little mould developed in beds sprayed two or three times a week with copper preparations, while shirlan XP showed a fungicidal value approximately equal to that of Bordeaux mixture, copper emulsion, and colloidal copper. The fungicides used differed markedly in their effect on the seedlings, those from plots sprayed with shirlan XP taking root best, followed in order of descending merit by those from the untreated plots, the plots sprayed with colloidal copper, and copper emulsion. Bordeaux mixture (2–1–50) seriously injured the seedlings. It is concluded that spray applications twice a week exert a marked degree of control in seasons of light infection.

Angell (H. R.), Allan (J. M.), & Hill (A. V.). **Downy mildew (blue mould) of Tobacco: its control by benzol and toluol vapours in covered seed beds. II.**—*J. Coun. sci. industr. Res. Aust.*, ix, 2, pp. 97–106, 2 figs., 1936.

The results of further experiments in the control of downy mildew of tobacco [*Peronospora tabacina*: see preceding abstracts] carried out in the spring of 1935 are reported.

At Eurobin, Victoria, twelve shallow square cans, each $4\frac{3}{4}$ by $4\frac{3}{4}$ by $1\frac{1}{2}$ in. deep, were placed in each bed about 5 in. above the soil so as to avoid local injury. Benzol was added to the cans in 18 beds, toluol to 2, and 1 other was left as control. Mildew destroyed all the seedlings in the control bed but no disease was observed in the 20 treated beds which yielded 200,000 seedlings for transplanting. One bed of seedlings, protected by benzol during the night, was repeatedly inoculated but the disease did not appear. In 19 late-sown beds benzol protected the seedlings completely whereas in one untreated bed the disease was widespread.

At Ashford, New South Wales, one bed was treated with benzol, one with toluol, and a third left as a control. The beds had been constructed to conserve the vapours, and when during rainy weather the seed-bed covers were kept in position from 28th to 30th September the benzol vapour severely injured, and the toluol vapour killed, the seedlings. The injured seedlings recovered when the evaporating surface was reduced from $\frac{1}{72}$ to $\frac{1}{144}$ of the seed-bed area. The control bed was then protected by benzol and the toluol bed was resown and used as a control. Downy mildew followed inoculations in the control bed, but in spite of the introduction of infected seedlings and inoculation no disease appeared in the treated beds, from each of which 10,000 healthy seedlings were obtained. In one small seed-bed petrol also gave complete control.

At Canberra similar results were obtained; no disease appeared in the two benzol-protected beds but it developed throughout the control bed. In this experiment the frames were padded to prevent vapour loss and an evaporating surface $\frac{1}{144}$ of seed-bed area was quite adequate.

In seed-beds of the same type the amount of benzol used per bed per day varied from 0·3 galls. at Canberra to 0·58 at Eurobin. The total

quantity used per bed ranged from 18·6 to 44 galls., but the latter figure may be reduced by taking more effective means to prevent evaporation. On account of fungal discoloration the oiled calico covers of the seed beds have to be renewed each season. The efficacy of the method having been established, attention is being directed to reduction of cost and maintenance. Already a simple frame has been used by farmers in South Australia with good results.

AINSWORTH (G. C.). **'Bushy stunt': a virus disease of the Tomato.**—*J. Minist. Agric.*, xliii, 3, pp. 266–269, 4 pl., 1936.

The author gives a detailed description of the symptoms of the new virus disease of tomatoes recorded by K. M. Smith in June, 1935 [*R.A.M.*, xv, p. 263], and for which the name 'bushy stunt' is now proposed. Seedlings are frequently killed outright, and those that survive remain stunted and develop twisted, misshapen leaves. The disease is much more readily transmissible by sap inoculations to seedlings than to larger plants, in which the virus often appears to remain localized in the inoculated leaflets. Roguing out the affected plants and care in pruning are the only control methods recommended.

OGILVIE (L.). **A note on the occurrence of new virus diseases of the Tomato in the Bristol Province.**—*Rep. agric. hort. Res. Sta. Bristol, 1935*, pp. 104–106, [1936].

After briefly describing the symptoms of two virus diseases of tomatoes [bushy stunt: see preceding abstract; and an unnamed disease: Smith's third type described in *R.A.M.*, xv, p. 181] observed for the first time in the vicinity of Bristol in 1935 the author warns growers against mistaking the symptoms for those due to cold, faulty cultivation, drought, excessive watering, mineral deficiencies, and the like. As virus diseases are transmitted from tobacco to tomatoes workers should not be allowed to smoke in the houses and should wash their hands before touching the plants.

WARNER (ELSBETH E.). **Black rot of Tomato, Lycopersicum esculentum, caused by Alternaria sp.**—*Phytopathology*, xxvi, 6, pp. 530–549, 8 figs., 1936.

A comprehensive account is given of the writer's morphological, physiological, and cultural studies of an undetermined species of *Alternaria* responsible for a disease of green and ripe tomatoes (Marglobe, Ponderosa, and Pritchard being the varieties used in these experiments) which may either develop internally and progress outwards or start on the surface and proceed towards the interior. The external lesions, which generally occur at the blossom end, are slightly wrinkled, dark brown, and range from minute pinheads to areas extending completely across the fruit and giving it a flattened aspect. At a later stage the spots develop velvety mats of conidia, and under humid conditions harvested fruits rapidly become covered with a greyish-white mycelium. The internal lesions are dry, leathery, pitch black, and measure 1 to 2 in. in diameter.

The fungus grew best on strained tomato juice agar. The conidiophores are tea-green at maturity and measure 59·2 to 74 by 1·6 to 2·2 μ.

The dark brown conidia, borne in branched chains of 1 to 11, are furnished with 3 to 6 transverse and 1 to 3 longitudinal septa and measure 20·8 to 36 by 3·2 to 9·6 μ, the apical cell or isthmus being 0·2 to 0·5 μ long. Dark brown, thick-walled, circular, quadricellular resting spores, 9·6 to 12·3 μ in diameter, were formed when the medium was almost completely digested. The organism made good growth at 15° to 24° C. but failed to develop to any extent at blood heat or at 10° to 15°.

The results of inoculation experiments with the *Alternaria* indicate that the hyphae enter the fruit either through the stigma of a newly opened flower or through fresh wounds inflicted by insects or mechanical means. Insects may also be instrumental in conveying the spores from diseased to healthy fruits, though wind would seem to be the principal agent of dissemination. Infected fruits drop to the ground and there decay, leaving the conidia and resting spores in the soil. Severe winter conditions kill the former while the latter survive to be carried by the following season's wind-blown dust to reinfect the flowers of the new crop, the disease then being further spread by the conidia developing in the invaded fruits. Evidence was obtained that the fungus is seed-borne; in one test it reduced the incidence of germination from 100 to 22 per cent.

Chadwick (L. C.). **Chlorosis of Pin Oaks.**—*Proc. Amer. Soc. hort. Sci.*, *1935*, xxxiii, pp. 669–673, 1936.

A tabulated account is given of recent experiments at the Ohio State University in the control of chlorosis of pin oaks (*Quercus palustris*) [*R.A.M.*, v, p. 597] by spraying with 0·5 or 5 per cent. ferrous sulphate [cf. ibid., xiv, p. 753], injecting the same material in powdered form into two or three holes ⅜ in. in diameter and 2 to 2½ in. deep in the trunk at the rate of 2 gm. per hole, and applying ferrous sulphate to holes about 15 in. deep evenly distributed in the soil below the branches (about 65 holes per tree 14 in. in diameter), either alone, combined with finely ground sulphur (½ lb. of each per in. in diameter of the trunk), or these two materials together with a complete 10–6–4 fertilizer (4 lb. per in. in trunk diameter). Of these treatments the soil applications of ferrous sulphate and sulphur gave the most satisfactory results, inducing a return, within three or four months, to an almost or quite normal condition.

Hepting (G. H.). **A destructive disease of the Mimosa tree in the Carolinas.**—*Plant Dis. Reptr*, xx, 11, pp. 177–178, 1936. [Mimeographed.]

A destructive disease of mimosa (*Albizzia julibrissin*) trees recently observed in North and South Carolina has been found to be constantly associated with a *Fusarium* of the *oxysporum* group, possibly identical with *F. albizziae* [*F. merismoides*: *R.A.M.*, xiv, pp. 123, 653], described from the Batum region of Russia by Voronikhin in 1920 as the agent of a similar vascular wilt. Symptoms of the disease include wilting, drooping, shrivelling, and sometimes yellowing of the foliage and a brown discoloration of the sapwood of the trunk, branches, or roots, the last named being probably the main channel of infection. Inoculation experiments to determine the pathogenicity of the fungus are in pro-

gress. Precautionary measures to prevent the spread of infection are briefly indicated.

JOHNSON (H. W.) & EDGERTON (C. W.). **A heart rot of Magnolia caused by Fomes geotropus.**—*Mycologia*, xxviii, 3, pp. 292–295, 1 fig., 1936.

Fomes geotropus [*R.A.M.*, iii, p. 243; ix, p. 421] has been found associated, evidently in a causal capacity, with a destructive greyish-black, green- or reddish-tinted, later brown, rot of *Magnolia grandiflora* heartwood at the Louisiana State University, Baton Rouge. The fungus is believed to enter the tree (apparently a new host) through wounds due to fire or other agencies. Observations made on a tree which fell in December, 1929, showed that termites and other wood-boring insects were abundant in the rotted heartwood and no doubt helped to reduce it to a soft, brown, crumbling mass that gradually fell out, leaving a central cavity tapering upwards from a diameter of 36 in. at the base to a slit-like hollow 4 by 1 in. at 20 ft. above the ground. Just above this point the incipient stages of decay surrounded a shake in the heartwood extending to a height of 38 to 40 ft., the edge of the rotted area being marked by dark zonate lines. Affected trees present a 'stag-head' appearance owing to the sparse leafage of the crowns and the death of the upper branches.

DEARNESS (J.). **Reliquiae kauffmani.** [Material left by Kauffman.]—*Mycologia*, xxviii, 3, pp. 209–213, 1936.

English diagnoses are given of 13 new species of fungi collected by the late C. H. Kauffman, including *Septogloeum parasiticum* Kauff. & Dearn., found in the cortex of elms (*Ulmus americana*) in Michigan, causing a dying-off of affected branchlets. The fungus is characterized by hyaline, oblong, granular, triseptate conidia, 28 to 52 by 12 to 15 μ, exuded in a faintly pinkish pulverulent mass from conidiophores measuring 10 to 45 by 3 μ.

PEACE (T. R.). **Destructive fairy rings, associated with Paxillus giganteus, in young Pine plantations.**—*Forestry*, x, 1, pp. 74–78, 1 pl., 1 diag., 1936.

The occurrence is recorded of 15 fairy rings [*R.A.M.*, xiii, p. 254], 24 to 100 yards in diameter, causing considerable damage in young Scots pine [*Pinus sylvestris*] plantations at Thetford Chase on the borders of Norfolk and Suffolk, where they are due to *Paxillus giganteus*, and one at Heggiesmuir in Fife, where the fungus concerned was identified from a poor specimen as *P. extenuatus* but may possibly be *P. giganteus* also.

In the centre of the rings the trees are healthy. These are surrounded by zones containing (1) small dead trees with many missing, (2) larger dead trees, and (3) an outermost zone of unhealthy and dying trees. A ring of fructifications develops in the autumn between zones (2) and (3). The effect of the fungus on the pines is to cause shedding of the older needles, the formation of short shoots with the needles unusually close together, giving a tufted appearance and later die-back of the branches leading to death. Damage occurs before the mycelial mat has reached

the trees and is either due to the toxic action of the fungus or parasitism. Trenching at Heggiesmuir in 1932 has so far proved successful in stopping the spread of the fungus.

RAY (W. W.). **Pathogenicity and cultural experiments with Caliciopsis pinea.**—*Mycologia*, xxviii, 3, pp. 201–208, 6 figs., 1936.

White pines (*Pinus strobus*) and other conifers, e.g., *P. echinata* and *P. virginiana*, in New York and elsewhere in North America are stated frequently to bear two types of canker associated with *Caliciopsis pinea* [*R.A.M.*, xv, p. 620], one consisting of circular, sharply delimited, reddish-brown, depressed areas up to several inches in diameter and often confluent, sometimes encircling large branches and even the trunk, and the other described by Overholts (*Mycologia*, xxii, p. 235, 1930) as resembling the extreme roughening of the bark caused by the pine woolly aphis [*Chermes pini*]. The latter form of canker appears to be the more injurious.

Cultures of the fungus were obtained from the unicellular, subglobose, light brown ascospores and the resultant mycelium or spore suspensions inserted through slits in the bark of healthy white pines under sterile conditions in the spring of 1934. By the following autumn the typical reddish-brown cankers had developed at the sites of inoculation, and during the spring of 1935 stromata and spermogonia were formed on several; at the time of writing, in August, 1935, however, none of the spine-like stromatic columns destined to contain the asci and spores had been produced. It seems evident from these results that *C. pinea* is the agent of the cankers described, but extensive field studies are necessary to determine the importance of the disease in the nursery and forest.

The fungus grew somewhat better on maize meal than on any of the other media tested, forming small, flask-shaped to globose spermogonia singly or in groups on branched structures, mostly in the depths of the substratum. From the spermogonia the spermatia were exuded in the form of white opaque drops. The buff to dark brown mycelium grew very slowly and frequently presented a zonate aspect. Rhizomorph-like strands were formed in a number of cases by hyphal fusion. Only in two out of many trials was it possible to induce the development of ascospores, partly, no doubt, on account of the slow fruiting habit of the fungus.

FAULL (J. H.). **Two Spruce-infecting rusts—Chrysomyxa piperiana and Chrysomyxa chiogenis.**—*J. Arnold Arbor.*, xvii, 2, pp. 109–114, 1936.

Recent successful infection experiments carried out in the Arnold Arboretum with aecidiospores of *Peridermium parksianum* from *Picea sitchensis* [*R.A.M.*, xiii, p. 412] on *Rhododendron macrophyllum* demonstrated that this fungus is the haploid stage of the rust known as *Chrysomyxa piperiana*, a common rust in the uredospore stage on *R. macrophyllum* on the Pacific slope of the north-western United States. Two collections of the teleutospore stage on overwintered rhododendron leaves were made in Oregon and enable the author to present a complete taxonomic description of *C. piperiana*.

Infection experiments with uredospores of *C. chiogenis* from *Chiogenes hispidula* on *Picea glauca* and *P. mariana* showed that both these species serve as aecidial hosts of the fungus, a full description of which is given.

Peace (T. R.). **Spraying against Meria laricis, the leaf cast disease of Larch.**—*Forestry*, x, 1, pp. 79–82, 1936.

In spraying experiments in 1933 against the leaf cast (*Meria laricis*) [*R.A.M.*, xv, p. 325] of young larch stock in the New Forest, amberene (1½ per cent.) applied every two or three weeks gave good control, whereas monthly sprayings were not satisfactory. In the Forest of Dean fortnightly applications of amberene (1½ and 2 per cent.), lime-sulphur, and sulsol (each 1 per cent.) were successful in 1933, and at Newton, Morayshire, fortnightly treatment with sulsol, 1 per cent. or 0·3 per cent. plus 0·05 per cent. special wetting compound, were both extremely satisfactory in 1935. On the basis of these experiments and those previously described the author recommends the use of amberene (1½ per cent.), sulsol (0·3 per cent. plus wetter), lime-sulphur, and liver of sulphur (0·7 per cent.) against the disease. On no account should spraying be done on hot, sunny days, and lath and other sheltering removed should be replaced immediately after spraying.

Further observations on the disease have shown that the effect of *M. laricis* is to weaken rather than kill the plants and a heavy attack normally entails a larger proportion of very small plants. Spraying results in fewer small plants with a corresponding increase in value varying from 8 to 88 per cent., but when the attack is slight or the growing season favourable the increase in value of the sprayed plants may be negligible.

Mounce (Irene) & Macrae (Ruth). **The behaviour of paired monosporous mycelia of Lenzites saepiaria (Wulf.) Fr., L. trabea (Pers.) Fr., L. thermophila Falck, and Trametes americana Overh.**—*Canad. J. Res.*, xiv, 6, pp. 215–221, 1 pl., 8 diags., 1936.

In view of the similarities existing between *Lenzites sepiaria*, *Trametes americana* (until recently referred to *T. odorata* or *T. protracta* and which, it has been suggested, may be merely a pored form of *L. sepiaria*) [*R.A.M.*, xv, p. 332], and *L. trabea* an attempt was made to apply the clamp connexion criterion for the differentiation of these species, of which the two first named occur on coniferous wood, the third on that of deciduous trees, and all three on constructional timber.

By pairing monospore mycelia of *L. sepiaria* it was found that the fungus is heterothallic and bipolar. *T. americana* shows the same characters. No clamp connexions were formed, however, as the result of 38 pairings of these two species, a result which the authors regard as lending weight to the view that they are distinct. *L. trabea* was likewise found to be heterothallic and formed no clamp connexions with either *L. sepiaria* or *T. americana*.

A comparison of *T. trabea* with *L. thermophila* (also found to be heterothallic and bipolar) [ibid., xi, p. 684; xiii, p. 815] showed them to be completely interfertile, corroborating Cartwright's contention that they represent one species.

ERNEST (ELIZABETH C. M.). **A test for the presence of natural preservative substances in wood.**—*Forestry*, x, 1, pp. 58–64, 1 pl., 1936.

A method is described of determining the presence or absence in a timber of any natural preservative substance. Petri dishes partitioned by a glass slip are filled in one half with damp sawdust and in the other with nutrient agar. A transplant from a culture of a wood-destroying fungus is placed on the agar and the growth recorded. If the wood contains no toxic substance growth is unimpeded; if a water-soluble toxic substance is present it diffuses into the agar and reduces growth near the sawdust; if an insoluble toxic substance is present growth over the sawdust is inhibited.

Results obtained with 15 timbers are tabulated. A number showed no toxic substances to be present, but *Sequoia sempervirens*, *Juniperus procera*, *Taxodium distichum*, *Tectona grandis*, *Thuja plicata*, and other species were toxic to certain of the test fungi used. The last-named permitted growth only on agar away from the sawdust, hot-water extracts of which were also toxic.

WOLF (F. A.). **False mildew of Red Mulberry.**—*Mycologia*, xxviii, 3, pp. 268–277, 3 figs., 1936.

Red mulberries (*Morus rubra*) in North Carolina are liable to attack by a false mildew, first appearing on the leaves in July in the shape of an effuse, white, cobweb-like coating, later turning yellow, and ultimately becoming brown and necrotic.

The mycelium of the causal agent, *Mycosphaerella arachnoidea* sp. nov., emerges from the stomata and extends over the leaf surface, forming a closely adpressed, branched, tangled, hyphal weft, bearing short, knob-like conidiophores arising laterally from the hyphae and producing acrogenously hyaline, septate, blunt-pointed conidia, 40 to 70 by 3·75 to 4·5 μ, belonging to the genus *Cercosporella*. The perithecial stage is initiated just prior to the abscission of the leaves in October, at which time the necrotic areas on the upper surfaces are also densely occupied by dark spermogonial primordia. The spermogonia measure 40 to 65 μ in diameter and are filled with rod-shaped, hyaline spermatia, 4 by 1·25 μ. By the spring the developing perithecia project about half their height above the decaying leaf surface, appearing as black points densely aggregated in patches. The thin-walled, black, papillate perithecia range from 40 to 100 μ in diameter, while the fasciculate asci measure 45 to 54 by 7 to 8·5 μ and contain biseriate, hyaline, bicellular, curved ascospores, 14 to 17 by 3·5 to 4 μ.

The fungus was cultured both from ascospores and conidia and produced on potato agar a rather compact, white to faintly pink growth which remained sterile. Inoculation of healthy leaves with fragments of leaves bearing perithecia resulted in the formation three to four weeks later of a whitish coating of mycelium and conidia of the *Cercosporella* originally observed. The species in question is obviously distinct from the two others previously reported on mulberry, viz., *C. mori* and *C. maculans* [*R.A.M.*, xv, p. 67], and is accordingly designated *C. arachnoidea* nom. nov. *M. arachnoidea* differs in various respects from *Sphaerella morifolia*, *S. mori-albae*, and *M. mori* [ibid., xv, p. 66], but bears some resemblance to *M. moricola* described in 1919 by

Sawada (Descriptive catalogue of the Formosan fungi, I, p. 94) in Japanese. It has, however, so far been impossible to procure a specimen of the latter for comparison, and the name of *M. arachnoidea* has therefore been conferred on the American fungus to avoid further confusion at the present stage.

Roy (H.). **Le pourridié sur les Noyers de l'Isère.** [Walnut decay in the Isère.]—*J. Agric. prat., Paris*, N.S., c, 23, pp. 467–470, 4 figs., 1936.

Attention is drawn to the very serious ravages proceeding in the extensive walnut plantations of the Isère, France, due to a variety of causes, including infection by the honey agaric [*Armillaria mellea*: *R.A.M.*, xi, p. 95]. *Juglans nigra* has been found to be highly resistant to the disease and very encouraging results have been given to date by experiments (still in progress) in its use as a stock for the susceptible local Franquet variety, which produces the much-prized Grenoble walnuts.

Ogilvie (L.) & Brian (P. W.). **Progress report on vegetable diseases. VII.**—*Rep. agric. hort. Res. Sta. Bristol, 1935*, pp. 110–117, 1 pl., [1936].

Experimental data [which are tabulated] showed that marked varietal differences exist in the resistance of cabbage lettuce to mosaic [*R.A.M.*, xiv, p. 730]. All the Year Round variety was very severely attacked whereas the related varieties Feltham King and Spring Beauty were little affected. The May Queen and MacHatties Giant types were badly diseased, the Trocadero and Lee's Immense types did not react uniformly, the Arctic types were very severely affected, while Stanstead Park and its related varieties Early Spring and Tremont Winter were highly resistant. Later plantings of winter lettuce were found to be less likely to be severely affected with mosaic than earlier plantings, probably owing to the increasing scarcity of aphids in the winter.

Further experiments in the control of mint (*Mentha villoso-nervata*) rust [*Puccinia menthae*: ibid., xv, p. 745] showed that immersion of the runners in water at either 105°, 110°, or 115° F. for ten minutes was completely effective.

Laske. **Krankheiten und Schädlinge der Zucker- und Futterrübe.** [Diseases and pests of the Sugar and Fodder Beet.]—*Zbl. Zuckerindustr.*, xliv, 23, pp. 562–565, 12 figs., 1936.

In addition to the important heart and dry rot and crinkle of beets [*R.A.M.*, xv, p. 477], the following diseases deserve special attention in Germany: root rot [*Phoma betae*, *Pythium de Baryanum*, and *Aphanomyces levis*: ibid., xv, p. 550], and leaf spot (*Cercospora beticola*) [ibid., xv, p. 696], which may reduce the sugar content by as much as 4 per cent. Discussing the possibilities of control in the latter case, the writer states that repeated applications of Bordeaux mixture, found effective elsewhere, are uneconomic under German conditions owing to the erratic behaviour of the fungus. It has been observed, however, that the use of borax against heart and dry rot is incidentally valuable in combating eaf spot by protracting the vegetative functions of the plants and so enhancing their resistance to infection. A similar effect is produced by

the late sowing practised in connexion with the trapping of the beet bug [*Zosmenus quadratus*], the vector of crinkle [ibid., xv, p. 549].

DECOUX (L.), VANDERWAEREN (J.), ROLAND (G.), & SIMON (M.). **Considérations spéciales sur la pourriture du cœur de la Betterave sucrière.** [Special considerations on heart rot of Sugar-Beet.]—*Publ. Inst. belge Amélior. Better.*, iv, 3, pp. 67–77, 1936. [Flemish, German, and English summaries.]

Further studies in Belgium on heart rot of sugar-beets [*R.A.M.*, xiv, p. 808; xv, p. 696] showed that it causes losses of up to 30 per cent. of the crop. Incidence was increased by excessive manuring, and also by wide spacing, and was nearly twice as heavy on a variety with poor foliage as on one with dense foliage. The application of 3 per cent. borax solution to the soil at the rate equivalent to 30 kg. borax per hect. as late as 16th September very slightly reduced the spread of the disease, while one made on 26th August (28 kg. per hect. dissolved in 1,400 l. water) reduced subsequent spread from 55 per cent. in the controls to 45 per cent. Borax should not be applied later than the end of August. Even on healthy beets the borax had a favourable effect, increasing both yield and sugar content.

DECOUX (L.), VANDERWAEREN (J.), & ROLAND (G.). **La végétation de la Betterave en Belgique au cours de l'année 1935.** [The growth of the Beetroot in Belgium during the year 1935.]—*Publ. Inst. belge Amélior. Better.*, iv, 3, pp. 79–94, 1 graph, 1936. [Flemish, German, and English summaries.]

The following beet diseases were recorded in Belgium in 1935. In consequence of wet conditions for germination of the seed blackleg [associated with *Pythium de Baryanum*, *Hypochnus* [*Corticium*] *solani* and *Phoma betae*: *R.A.M.*, ix, p. 152; xiii, p. 210; xv, p. 337] was prevalent and some fields had to be replanted. Cercosporiosis [*Cercospora beticola*: ibid., xiii, p. 210, and above, p. 763] and heart rot [see preceding abstract] were less important than in 1934, rust [*Uromyces betae*] occurred in two localities, yellows [ibid., xv, p. 549] was present only to a slight extent, owing probably to the unfavourable weather for the vector, mildew [*Peronospora schachtii*: ibid., xv, p. 193] was noted in a few cases, and a disease [strangle: ibid., xiv, p. 548] new to or very rare in Belgium, though previously recorded from Holland, was observed at Elixem: it was characterized by root 'strangulation' a little below the collar, followed by a withering of the leaves and the death of the plants.

HODGES (F. A.). **Fungi of Sugar Beets.**—*Phytopathology*, xxvi, 6, pp. 550–563, 3 figs., 1 map, 1936.

The writer describes and discusses the results of his studies on the fungal flora of some 5,000 beets grown at Syracuse, New York, and elsewhere in the United States.

The following were the most active and destructive agents of decay in stored beets among the 85 species and varieties investigated: *Phoma betae*, *Rhizoctonia* sp., *Sphaeropsis* sp., *Fusarium dimerum* [*R.A.M.*, xiii, p. 594], *F. orthoceras*, *F. semitectum* var. *majus* [ibid., xiv, p. 472], *F. ventricosum* [*F. argillaceum*: ibid., xiii, p. 261], *F. diversisporum*

[ibid., xiv, pp. 427, 472], *F. arcuosporum* [*F. scirpi* var. *acuminatum*: ibid., xv, p. 654], *F. merismoides* [ibid., xv, p. 643], *F. solani*, *F. chenopodium* [*F. scirpi*: ibid., xv, p. 531], *F. clavatum* [*F. flocciferum*], *F. bullatum* var. *minus* [*F. equiseti* var. *bullatum*: ibid., xiii, p. 594], *F. trichothecioides* [ibid., xv, p. 6], *F.* [*javanicum* var.] *radicicola* [ibid., xiii, p. 397], and *F. scirpi* var. *filiferum*. A considerable amount of rotting was also caused by *Penicillium commune* [ibid., ix, p. 676], *Rhizopus nigricans*, *F. culmorum*, *F. arcuatum* [*F. avenaceum* f. 1], *F. discolor* [*F. sambucinum*: ibid., xv, p. 643], and *F. dimerum* var. *pusillum*. The most extensive penetration of the roots was induced by *F. orthoceras* and *F. dimerum*, and under experimental conditions (beets in damp chambers) the latter caused the heaviest damage. These two fungi were also virulently pathogenic to seedlings of the Menomonee variety in the laboratory (50 to 75 per cent. infection), while in field tests *F. orthoceras* proved to be as actively parasitic as in storage. The type of rot caused by this organism is intermediate between the dry, corky and soft, slimy forms of decay, both resulting from *Phoma betae* infection, and is characterized by a number of cavities, some of which are filled with mycelial growth.

The *Rhizoctonia* sp. was destructive to seedlings, besides producing some decay in stored beets. A species of *Alternaria* occurred as a comparatively mild leaf and petiole infection resulting in slight defoliation of field beets.

Benlloch (M.). **Enfermedades de las Judías.** [Bean diseases.]—*Agricultura, Madr.*, viii, pp. 61–62, 1935. [Abs. in *Herb. Abstr.*, vi, 1, p. 60, 1936.]

A bean [*Phaseolus vulgaris*] disease on material submitted for inspection from Burgos was diagnosed as that caused by *Bacterium phaseoli* [*R.A.M.*, xiv, pp. 560, 565]. All remedial measures hitherto tested are stated to have proved ineffectual, but a degree of control may be ensured by late sowing and the use of healthy seed.

Adam (D. B.). **'Halo blight' in French Beans. A report on measures for its control.**—*J. Dep. Agric. Vict.*, xxxiv, 1, pp. 34–45, 3 figs., 1936.

In studies on the control of halo blight (*Phytomonas* [*Bacterium*] *medicaginis phaseolicola*) [*R.A.M.*, xv, p. 627] of French beans [*Phaseolus vulgaris*] it was found that changes in the date of sowing may lead to considerable variation in the incidence of the disease, owing to differences in the weather conditions experienced immediately after planting. It is considered that beans for seed purposes should not, under Victoria conditions, be planted before 15th November or after Christmas.

Seed disinfection experiments showed that the best results were given by germisan and uspulun, the former being rather better than the latter. The seed was steeped in dilute solutions (0·05 to 0·1 per cent. for germisan) for 12 to 16 hours. Although seed treatment effected a marked reduction in the number of diseased seedlings, weather conditions may cause this initial advantage to be lost during the growth of the crop, with the result that the author does not consider that seed

disinfection offers a means of securing control under Victoria conditions.

Observations in badly diseased fields of Canadian Wonder beans showed individual plants to possess considerable resistance, and the selection and study of these types is thought to offer the best avenue for a solution of the problem of control. The varieties Pale Dun and (to a less extent) Feltham's Prolific also showed resistance.

PUGSLEY (A. T.). **Halo blight of Beans. Varietal resistance tests.**—*J. Dep. Agric. Vict.*, xxxiv, 6, pp. 311–315, 2 figs., 1936.

The failure of growers in Victoria to control halo blight (*Phytomonas* [*Bacterium*] *medicaginis* var. *phaseolicola*) [see preceding abstract] of French beans [*Phaseolus vulgaris*] by roguing diseased plants [*R.A.M.*, xiv, p. 140] is attributed to the local weather conditions, which favour the rapid spread of infection. Seed disinfection experiments were unsuccessful, and laboratory studies showed the presence of the bacterium in the third layer of the seed coat and also completely surrounding the cotyledons, on which small, circular, cream-coloured spots occur, containing large masses of bacteria in the intercellular spaces, and penetrating to a depth of four to five cells.

A strain of the Canadian Wonder variety termed Burnley Selection showed outstanding resistance and gave an average yield of 26 and 29·5 lb. per plot, commercial Canadian Wonder giving only 6·25 lb. per plot. As a result of variety trials in 1935–6 Pale Dun is also classed as very resistant, Star, New Discovery, Black Prince, Black Wonder, Feltham's Prolific, Superlative, and Ne Plus Ultra are moderately resistant, while Surprise, Brown Beauty, and Canadian Wonder are very susceptible. The varieties Tweed Wonder, Magnum Bonum (Flagelot Victoria), and Afrikander (Masterpiece) were not included in the test but were observed on other occasions to be very susceptible.

In an appendix the author does not accept *P.* [*Bact.*] *medicaginis* as the name for the halo-blight organism [ibid., xi, p. 418] and considers that more detailed studies, including serological analysis, would afford a basis for the specific and varietal delimitation of bacteria belonging to this group.

PARKER (M. C.). **Inheritance of resistance to the common mosaic virus in the Bean.**—*J. agric. Res.*, lii, 12, pp. 895–915, 1 fig., 1936.

The [tabulated] results of the experiments discussed in this paper showed that the reaction to common bean (*Phaseolus vulgaris*) mosaic [*R.A.M.*, xv, p. 418] in the progeny of the reciprocal crosses between the resistant Michigan Robust and the susceptible Stringless Green Refugee varieties is to a large extent governed by the maternal parent, but with a marked tendency towards convergence in the younger generations. Thus, the F_1, F_2, F_3 generations of the susceptible (female) × resistant (male) cross showed 100, 99, and 91 per cent. susceptibility, respectively, while the same progenies of the reciprocal cross showed 82, 56, and 35 per cent. resistance, respectively. Some of the plants resistant in F_2 produced both susceptible and resistant F_3 individuals, while susceptible F_2 hybrids gave rise to some resistant plants in F_3. These results are not explicable on a simple Mendelian basis and suggest

that the immediate reaction of the plant to the mosaic virus is governed by the cytoplasm or some extranuclear inclusion. The convergence of the results from reciprocal crosses in the F_2 and F_3 indicates that the ultimate control is nuclear but that there is a delayed expression of the action of the genes; it must also be assumed that certain genotypes modify the reaction of the cytoplasm more rapidly than others.

The F_1 progenies of crosses between the resistant Corbett Refugee and the susceptible Stringless Green Refugee and the F_1 of the reciprocal crosses were all resistant, but in the F_2 generation 91 per cent. of the Corbett Refugee × Stringless Green Refugee progeny were resistant and 9 per cent. susceptible, while in the reciprocal cross 79 per cent. were resistant and 21 per cent. susceptible. These results, like the foregoing, do not conform to any Mendelian ratio, though when Stringless Green Refugee was used as the female parent the ratio approximated 3 : 1. Crosses between the two resistant Corbett Refugee and Michigan Robust varieties yielded all resistant F_1 plants, but in the F_2 generation there were 7 per cent. susceptibles from Corbett Refugee × Michigan Robust and 9 per cent. susceptibles from the reciprocal cross, a clear evidence that the two varieties differ in their bases for resistance, or at least that they differ in ability to transmit this resistance in crosses with susceptible plants.

Löhnis (Marie P.). **Wat veroorzaakt kwade harten in Erwten?** [What is the cause of marsh spot in Peas?]—*Tijdschr. PlZiekt.*, xlii, 6, pp. 159–167, 1936. [English summary.]

Comparative chemical analyses of pea seeds in Holland having revealed no difference between the boron content of healthy material and that affected by marsh spot [*R.A.M.*, xv, p. 626], the writer conducted similar tests to determine the possible relation of manganese deficiency to the disease. In all seed samples the manganese content was found to be higher in sound than in diseased seeds (0·01 mg. per 2 gm. dry weight as against 0·0075 mg. in the Schokker variety and from 0·0108 to 0·0125 mg. as against 0·0075 mg.—0·01 mg. in small seeds—for Mansholt Plukerwt), suggesting that an important part is played by this element in the health of peas.

Geach (W. L.). **Root rot of grey Peas in Tasmania.**—*J. Coun. sci. industr. Res. Aust.*, ix, 2, pp. 77–87, 1936.

A severe root rot of peas occurs in Tasmania throughout the pea-growing area often reducing the yield so considerably that the crop is unprofitable. The degree of infection is slight at first but increases with subsequent sowings, particularly when these closely follow one another.

Except for a frequent red coloration of the vascular cylinders of the roots the symptoms of the disease agree with those recorded for *Aphanomyces euteiches* [*R.A.M.*, xiv, pp. 151, 286, 425] to which Dr. E. I. McLennan attributed the disease in an unpublished report dated 1927. In cultural studies the Tasmanian organism, which the author regards as probably a strain of *A. euteiches*, differed from the type description in that it formed coils of hyphae somewhat like the hair-spring of a watch at a number of points on the surface of nearly all the media used, especially on prune agar and maize meal agar. Cable-like

strands composed of two or more hyphae twisted about one another developed on the latter medium. Although encysted zoospores were formed in large numbers attempts to induce the abundant production of motile zoospores usually formed by this species were unsuccessful. The addition of peptone to maize meal agar prevented the formation of sexual organs, and sodium nitrate and ammonium sulphate produced a similar effect when used in small quantities, whilst in larger amounts they prevented growth completely. In a comparative test the fungus proved to be more sensitive to sodium nitrate than seven other root-rotting fungi.

Inoculation of the soil, whether sterilized or unsterilized, in pot experiments in the greenhouse and out-of-doors resulted in the reproduction of the disease on peas. In the greenhouse trials the fungus readily infected 12 varieties of peas, subterranean clover (*Trifolium subterraneum*), *Vicia* spp., lucerne, and sweet peas, and was weakly parasitic on barley and oats. Experimental evidence was obtained that the organism persists in the soil for more than two years.

In pot experiments in the greenhouse the addition of urea at the rate of 1, 0·5, and 0·25 gm. per pot reduced the diseased plants from 27 in the control to 1, 3, and 2, respectively, 50 seeds being used in each pot. In another experiment trays of infected soil were treated with urea (3·75 gm.), ammonium sulphate (8 gm.), and sodium nitrate (10·6 gm.), respectively, and the diseased seedlings (from the second sowing of 200 peas per pot) were 87, 58, and 39, respectively, compared with 174 in the control. In further experiments in trays out-of-doors applications of urea gave a similar result while field plots (3 ft. by 3 ft.) treated with urea (at the rate of 1 cwt. per acre), sodium nitrate, and ammonium sulphate (the two last-named at the rate equivalent, as regards nitrogen, to the urea) yielded 139, 184, and 145 gm. of seed, respectively, compared with 75 gm. for the control.

Tisdale (W. B.) & Kelbert (G. A.). **Pink rot of Celery in Florida.**—*Plant. Dis. Reptr*, xx, 8, pp. 134–135, 1936. [Mimeographed.]

In the Sarasota area of Florida pink rot of celery (*Sclerotinia sclerotiorum*) [*R.A.M.*, xiii, p. 356] caused losses estimated at from 50 to 80 per cent. in the current mid-season's planting involving about 300 acres. Celery from these fields also suffered over 50 per cent. losses during transit. This exceptionally severe outbreak is attributed to frost injury in December after the crop was set and the subsequent cold rainy weather. Removal of injured leaves after the frost was said to have lessened the damage.

Neergaard (P.). **Attacks of Alternaria radicina on Celery and Carrot.**—Reprinted from *K. VetHøjsk. Aarrskr., 1936*, 42 pp., 11 figs., 3 graphs, 1936.

The outcome of the writer's investigations on the celery disease caused in Denmark by *Alternaria radicina*, for which the name of 'black mould root rot' is proposed to distinguish it from 'ordinary celery root rot' (*Phoma apiicola*), has already been summarized from another source [*R.A.M.*, xv, p. 275]. *A. radicina* was also found attack-

ing parsley, parsnip, and the roots and seeds of several Danish and foreign varieties of carrot.

A comparative study was made of herbarium specimens of *Macrosporium dauci* (Kühn) Rostrup and an undescribed species labelled by O. Rostrup '*M. daucinum*', of which the former has been said to be identical with *Alternaria brassicae* (Berk.) var. *dauci* (Kühn) Bolle [ibid., iii, p. 506], and the writer's isolation of *A. radicina*, with the result that no essential differences in spore size and shape were found between the Rostrup specimens and *A. radicina*. In three of Rostrup's preparations, as in those of *A. radicina*, the spores were deep brown, ellipsoid, oval, devoid of a rostrum, rounded at both ends, and measured on an average 39 to 48 by 16 to 23 μ, compared with 42 by 17 μ for *A. radicina*, whereas those of *A. brassicae* var. *dauci* are of a more vivid colour, rostrate, and measure 90 to 350 by 14 to 42 μ.

Good control of the black rot of carrot induced by *A. radicina* was obtained by seed treatment for $\frac{1}{2}$ to $1\frac{1}{2}$ hours in 0·25 per cent. germisan, sanagran [ibid., xv, p. 73], or uspulun.

Dearborn (C. H.) & Raleigh (G. J.). **A preliminary note on the control of internal browning of Cauliflower by the use of boron.**—*Proc. Amer. Soc. hort. Sci., 1935*, xxxiii, pp. 622–623, 1936.

Heavy losses are stated to have been sustained of recent years by growers in the Catskill Mountain district of New York State through a disease of cauliflower characterized by small, brown, concentric, water-soaked areas in the stem, centre, and small branches of the curd, whereby a bitter flavour is imparted both to raw and cooked heads. In severe cases rusty-brown areas also appear on the surface of the curd, and at this stage the trouble is also known locally as brown or red rot. In 24 fields in which borax was applied to the plants at the rate of 1·25 lb. per acre or incorporated at that of 2·5 lb. per acre with a 4–8–7 fertilizer, no superficial browning appeared, while in 22 the plants treated were also free from internal symptoms, which were present only to the extent of 5 per cent. in the borax-treated rows in the other two fields. In 45 per cent. of the experimental fields internal browning occurred in a virulent form in the rows on either side of those treated with borax, while external symptoms were also prevalent in several of the fields in the rows from which borax was omitted.

Greeves (T. N.) & Muskett (A. E.). **A temperature study of Pythium attack on Swede seedlings.**—*Ann. appl. Biol.*, xxiii, 2, pp. 264–270, 1 pl., 1936.

In the course of raising swede seedlings in pots in Belfast, many were observed to be killed before emerging without any subsequent signs of damping-off, and from one seedling a species of *Pythium*, placed by S. F. Ashby in the *P. de Baryanum* group, was isolated. Pot experiments with Ideal and Tipperary swedes showed that when the seeds were germinated and grown at low temperatures (average 5·8° C.) in soil inoculated with the fungus, many of the germinating seeds were killed off in a similar manner. The same held true at medium temperatures (average 10·2°), but the number of seeds killed before emerging

was very considerably reduced. High temperatures (23°), on the other hand, reduced the pre-emergence phase of the disease to a minimum, but favoured damping-off. Disinfection of the seed with an organic mercury compound failed to control the disease. These results are considered to indicate that the trouble could be best kept in check by germinating swede seeds at high temperature until emergence, after which the temperature should be lowered to encourage the development of sturdy seedlings.

Malençon (G.). **Une grave maladie des Artichauts au Maroc.** [A serious Artichoke disease in Morocco.]—*Rev. Mycologie*, N.S., i, 3, pp. 165–175, 3 pl., 1936.

Artichokes [*Cynara scolymus*] in French Morocco have for some years been seriously infected by a fungus closely resembling *Ascochyta hortorum*, previously recorded on the same host only from Italy [*R.A.M.*, v, p. 15].

The disease on the flower-heads varies in severity with the age of the plants, the seasonal conditions, and the prevailing humidity. Infection generally begins at the tips of the outermost bracts, and if the weather remains dry the attack is restricted to these parts. Their spotted appearance reduces the market value of the plants, though their edible parts are unimpaired. When dew or rain, however, persists within the flower-heads, these are attacked in the inner and not in the outer bracts, which dry more readily. Infection, not easily visible from the outside, proceeds rapidly from the top of the flower downwards. Oily spots appear on the bracts, which then turn a light-yellowish grey and later show a black, wet rot. Secondary attack by bacteria may develop. The toxins liberated by the fungus can kill host tissues more than 15 mm. in advance of the hyphae. The older affected parts become covered with pycnidia, the spores of which are carried in water farther down the flower-heads, leading finally to the complete destruction of their interior parts. The Vert de Laon variety with its compact flower-head is much more susceptible than the more open Violet d'Alger and varietal differences in bract infection appear to be due merely to morphological factors, since all varieties are equally susceptible to stem infection.

Stem infection does not appear to start at any particular level. A livid, translucent spot appears, gradually turning black and lengthening towards apex and base. The affected tissues become disorganized, soft, and covered with pycnidia. Infection spreads to the leaves along the midrib, on which pycnidia also develop. The blade is largely destroyed, but the shreds that remain also bear fructifications of the fungus. Under favourable conditions, the invasion of the stems is very rapid.

The light brown to nearly black, globular-depressed pycnidia, 150 to 350 μ in diameter, contain uni- or bicellular spores, 6 to 12·5 by 2·25 to 3 μ. In view of the small dimensions of the pycnidia and conidia and the specialization of this form on artichoke (eggplants in Morocco are never infected) the author considers that the fungus is a variety, homologous with *A. lycopersici* [*Didymella lycopersici*: ibid., viii, p. 10], of *A. hortorum*, and names it [with a Latin diagnosis] *A. hortorum* var.

compositarum n. var. It is possible that *A. cynarae* Maffei is identical with the author's fungus.

As artichokes are eaten raw, spraying requires to be effected with great care. The control measures recommended consist in the destruction of all affected plants, surface disinfection of the soil by spraying with Bordeaux mixture before the autumn rains set in, with a second application a fortnight later, and preventive spraying of the young plants with dilute [copper] oxychloride, [Bordeaux] mixture, or ortho-oxyquinoline salts, such as cryptonol [ibid., xiv, p. 552].

Shaw (F. J. F.). **Studies in Indian pulses. The inheritance of morphological characters and of wilt-resistance in Rahar (Cajanus indicus Spreng.).**—*Indian J. agric. Sci.*, vi, 2, pp. 139–187, 3 pl. (1 col.), 1 graph, 1936.

In part II of this paper the author gives a full tabulated account of his investigations during 1929–34 at the Pusa Agricultural Research Institute, India, on the inheritance of resistance of pigeon pea (*Cajanus indicus*) [*C. cajan*] to wilt (*Fusarium vasinfectum*) [*R.A.M.*, xiii, p. 346]. The F_2 populations of reciprocal crosses between the Pusa types 5 (susceptible) and 80 (resistant) were grown in infected fields and the percentage loss due to wilt suggested that inheritance of resistance may be found in a 9 : 7 or 27 : 37 ratio, indicating that two or three pairs of factors are concerned, resistance being dominant. No linkage was found between the inheritance of wilt resistance and that of any of the morphological characters studied. Further proof of the absence of linkage and the dependence of resistance on multiple factors was afforded by the F_3 generation. Selected families from the F_3 have been carried up to the F_6 generation and phenotypes possessing the quality of wilt resistance and most of the morphological characters of the susceptible parent have been isolated. Morphologically identical hybrids showed great variation in their reaction to wilt disease from almost complete resistance to complete susceptibility.

Mundkur (B. B.). **Influence of temperature and maturity on the incidence of Sann-Hemp and Pigeon Pea wilt at Pusa.**—*Indian J. agric. Sci.*, v, 5, pp. 609–618, 2 graphs, 1935. [Received 1936.]

Records made weekly of the deaths of sann-hemp (*Crotalaria juncea*) and pigeon pea (*Cajanus indicus*) [*C. cajan*] plants from *Fusarium vasinfectum* [*R.A.M.*, xv, p. 278 and preceding abstract] in experimental plots at Pusa and of the mean soil temperature showed that high soil temperatures, between 28° and 33° C., favoured the disease in sann-hemp, whereas low soil temperatures, between 17° and 29° favoured the disease in the pigeon pea. In addition to soil temperatures, maturity of the plants exercised an influence on their susceptibility to the fungus, most plants of the sann-hemp dying in the earlier part of the season and most of pigeon pea in the later. Statistical analysis of the data obtained showed that multiple coefficients of correlation between soil temperatures, maturity, and wilt resistance were significant and revealed high association between these variables. The values of partial coefficient of correlation between wilt incidence and soil temperature, eliminating the effect of maturity, or between wilt incidence and

maturity, eliminating the effect of soil temperature, were not significant, showing that the influence of soil temperatures and maturity on the incidence of wilt is not due to either of these acting independently but is a combined influence.

WILSON (R. D.). **A bacterial disease of Snake Beans.**—*J. Proc. Roy. Soc. N.S.W.*, lxix, pp. 215–223, 1 pl., 1936.

In January 1935, snake or asparagus beans (*Vigna sesquipedalis*) near Mudgee, New South Wales, were observed to be affected by a bacterial disease causing a reddish-brown spotting of the leaves, petioles, stems, and pods. The lesions were frequently encircled by a narrow zone of yellowish-green tissue, and the centres shrivelled and fell out. On the under sides of the leaves a blackening of the veins was sometimes observed. These symptoms agree closely with those of a similar disease of cowpea due to *Bacterium vignae* [*R.A.M.*, v, p. 401; vi, p. 276; cf. also ix, p. 695], which is believed to have been the agent of a bacterial disturbance of the same host observed at Glen Innes, New South Wales, in 1932, as recorded by Noble et al. [ibid., xiv, p. 618].

Comparative studies of the bacterium isolated from *V. sesquipedalis* (the pathogenicity of which was demonstrated by inoculation experiments), *Bact. vignae* (from California), and *Bact.* [*Pseudomonas*] *syringae* [ibid., xv, p. 678] (from lilac in New York and from citrus in Victoria) were carried out. Culturally and morphologically all three organisms were identical except in raffinose fermentation, and the differences between them in respect of pathogenicity to various plants are not considered to justify specific separation. The causal organism of snake bean leaf spot is therefore referred to *P. syringae*.

A 'rough' strain of the *V. sesquipedalis* pathogen arose as a mutant in beef extract and potato agar cultures. It differed from the normal smooth strain in its slight motility, apparent absence of flagella, and considerably lower degree of virulence.

No species of *Vigna* or other cultivated legume having been grown on the land occupied by the infested crop for some four or five years, there was reason to believe the disease to be carried on the seed imported from the United States, and this supposition was partly confirmed by greenhouse experiments with seed from the affected crop, which produced plants with the typical lesions yielding the organism described above.

HERSCHLER (A.). **Ernährungsstörungen an Reben durch Bodenverhältnisse mit besonderer Berücksichtigung von Kalimangelschäden.** [Nutritional disturbances in Vines due to soil conditions, with special reference to potassium deficiency injuries.]—*Ernähr. Pfl.*, xxxii, 11–12, pp. 197–204, 1 col. pl., 1 fig., 1936. [English and Spanish summaries on p. 216.]

On 'vine-sick' soils, in the Moselle, Saar, and Ruwer valleys, especially those of sandy composition with sticky subsoils of the lower and middle diluvial terraces, the foliage showed patchy discolorations. Such types of soil were found on analysis to be more or less acid and deficient in one or more plant foods. Lack of phosphoric acid was

characterized by punctiform, brown, shrivelled areas spreading from the leaf margins inwards and often covering a quarter of the lamina by the end of July. Affected leaves generally drooped and fell several weeks before the normal time, and the stocks made poor growth and gave low yields. Magnesium deficiency may possibly have been responsible for a conspicuous rusty to brownish-black mottling of the foliage, scorching of the margins, marked curtailment and branching of the nodes, and reductions of yield amounting to 50 per cent. or more, but the exact nature of these disturbances has not yet been elucidated. Potash shortage is characterized by prominent mosaic-like lesions starting in the intercostal areas and rapidly extending almost over the whole leaf. The grapes are still small and hard when healthy bunches are approaching maturity. The application of muriate of potash at the rate of 180 lb. per 1,200 sq. yds. led to the disappearance of these symptoms in one to three years.

Merjanian (A. S.) & Lipetzkaya (Mme A. D.). Влияние на продолжительность инкубационного периода болезни Виноградной лозы мильдью постоянных температур и переменных. [Effect of constant and fluctuating temperatures on the length of the incubation period of downy mildew of the Vine.]—*Sovetsk. Bot.*, *1936*, 3, pp. 68–77, 1 graph, 1936.

The authors describe the results of their controlled experiments and field observations [some details of which are given] on the incubation periods of vine mildew (*Plasmopara viticola*). Under the more or less constant temperature conditions which usually prevail in vine-growing areas during the spring the duration of these periods may be fairly accurately determined by means of Müller's curve [*R.A.M.*, xv, p. 702]. In regions, however, where during spring the day and night temperatures are subject to sudden and sharp fluctuations the incubation period may be considerably shortened (by as much as 72 hours); this occurs when night temperatures are higher and day temperatures are lower than normal for the season, the nocturnal rises being more important in this regard than the diurnal fall in temperature. Abnormally cold nights and abnormally warm days, on the other hand, did not appear to affect the length of the incubation period, which is considered to last from the actual penetration of the host tissues by the germ-tubes produced by the zoospores to the appearance of the conidial efflorescence, coinciding approximately, under unfavourable conditions of air humidity, with the formation of oily spots on the leaves. It was further shown that a closer estimation of the length of the incubation period may be obtained by a method based on the following considerations. It was experimentally established that the duration of the incubation period is determined by the sum total of degrees of 'active' or 'effective' average daily temperatures (i.e. the temperature above the 'critical' [minimum] points, calculated from Blunck's formula, below which the germination of the zoospores inside the stomata and the growth of the intramatrical hyphae are completely suppressed) prevailing during the incubation period. This sum total was shown to range, within the limits of 13° to 24° C. (the average temperatures of Müller's curve), from 58·9° to 62·6°, giving a working average of 61°.

The actual length of the incubation period appears to be obtained by dividing 61° by the average daily 'active' temperature, and the latter is calculated by subtracting from the actual temperature reading the 'critical' temperature for the given set of nocturnal and diurnal temperatures. A graduated table is appended showing the 'critical' temperatures within 13° and 24° of night and day temperatures.

It is thought that the shortening of the incubation period under the influence of higher night and lower day temperatures may be due to a physiological effect on the parasitic organism; a partial confirmation of this hypothesis was found in the facts that the incubation of the mildew was considerably lengthened by subjecting the developing spots to ether vapour, and that the conidia from such spots also took a longer time to form fresh conidia on the untreated host under normal conditions.

PETRI (L.). **Rassegna dei casi fitopatologici osservati nel 1935.** [Review of phytopathological records noted in 1935.]—*Boll. Staz. Pat. veg. Roma*, N.S., xvi, 1, pp. 1–25, 6 figs., 1936.

During the period under review [cf. *R.A.M.*, xiv, p. 679] wheat grown over a very large area in Friuli showed a serious wilt, the symptoms of which resembled those due to foot rot, associated only with *Leptosphaeria herpotrichoides* [ibid., xv, p. 709] and a *Pythium*; the leaves bore *Septoria graminum* [ibid., xi, p. 709]. Owing to the very low temperatures prevailing in the spring attacks by *Puccinia triticina* and *P. graminis* were limited, though the weather conditions strongly favoured infection by *P. glumarum*. *Cephalosporium sacchari* [ibid., xi, pp. 203, 562] was present saprophytically on discoloured maize tissues.

Grapes were infected by *Diplodia uvicola* Spesch., which is reported in the Caucasus to be a contributing factor in the production of a false black rot of the fruit clusters. Vine roots were severely rotted by *Rosellinia necatrix*, and in one vineyard by *Armillaria mellea*.

Olive fruits were attacked by *Sphaeropsis dalmatica* [ibid., xiv, p. 766] and the roots by *R. necatrix*. *S. malorum* Peck [*Physalospora obtusa*: ibid., xv, p. 726] occurred on pear branches. Young pears grafted on quince showed abundant formation of adventitious roots under the graft site; the condition is attributed to infection by *Phytomonas* [*Bacterium*] *rhizogenes* [ibid., xv, p. 663]. Apricots were affected by leptonecrosis [ibid., xiv, p. 800] and fig branches by *Bact. fici* [ibid., xii, p. 746]. Walnut collar and root rot, due principally to *Phytophthora cambivora* or a closely allied organism [ibid., xiv, p. 680], became increasingly prevalent.

Owing to the cold, dry winter and hot, dry summer, there was not much extension of 'mal secco' disease of lemons [*Deuterophoma tracheiphila*: ibid., xv, p. 575] in 1935. Green lemons sent from Acireale to Trieste showed leather-coloured depressed areas on the epicarp and reaching the mesocarp, associated with *Phomopsis cytosporella* [ibid., xii, p. 746]. Lemon fruits were affected by *Septoria citri* [ibid., xiv, p. 816]. Orange root rot (*Phytophthora citrophthora*) [ibid., xv, p. 213] was widespread and serious.

Young nursery stock of *Acer platanoides* was infected by a *Fusarium*

of the *lateritium* group; the tissues in the region of the collar broke down and the wood showed a blue discoloration. *Rhododendron ferrugineum* plants in gardens near Rome were affected by anthracnose (*Gloeosporium rhododendri* Br. & Cav.). Oleander (*Nerium oleander*) leaves affected by wilt due to *S. oleandrina* were received from two localities. A wilt of mulberry shoots caused by *F. lateritium* occurred in northern Italy. In March and April, *Lupinus luteus* growing near Rome showed the wilt due to *Ceratophorum setosum* [ibid., xiii, p. 166].

Diseases recorded on market-garden produce include spinach anthracnose (*Colletotrichum spinaciae*), *F. semitectum* [ibid., xiv, p. 472] on cucumber, and *Puccinia endiviae* and *Bremia lactucae* on endive [ibid., v, p. 275; ix, p. 224]. Tomato seedlings developed a rapid wilt as a result of infection of the collar by *P. parasitica*, the mycelium spreading up one-third of the stems. In four provinces tomatoes were severely damaged by *F. bulbigenum*. Tomato fruits showed round, yellow or greenish-yellow spots resembling those of the English form of spotted wilt [ibid., xv, pp. 324, 404], a yellow leaf-spotting also being present. *Agaricus* [*Psalliota*] *campestris* was damaged by *Verticillium malthousei* [ibid., xiii, p. 287]; improved ventilation was recommended as a control measure.

MARCHAL (É.). **Observations et recherches effectuées à la Station de Phytopathologie de l'État pendant l'année 1935.** [Observations and researches carried out at the State Phytopathological Station during the year 1935.]—*Bull. Inst. agron. Gembloux*, v, 2, pp. 105–111, 1936. [Flemish, German, and English summaries.]

This report [cf. *R.A.M.*, xiv, p. 679] contains, *inter alia*, the following items of phytopathological interest. Wheat in Belgium became affected in March with the foot rot due to *Cercosporella herpotrichoides* [see preceding abstract], frequently in association with a *Fusarium*. The foot rot due to *Ophiobolus graminis* was prevalent on compacted soils and where couch grass [*Agropyron repens*] was present. In some localities *Erysiphe graminis* and *Septoria tritici* [ibid., xv, p. 558] were exceptionally widespread on wheat.

Potato scab (*Actinomyces scabies*) was unusually common, owing to dry, hot weather in July and August. Several new centres of infection by *Synchytrium endobioticum* [ibid., xv, p. 601] were noted. Industrie potatoes, especially in the Ardennes, were affected by a condition referred to as physiological or pseudo-leaf roll, the top leaves rolling up, but the bottom ones not being brittle as in true leaf roll; the discoloration typical of the latter disease was also absent. The Industrie variety is very susceptible to the condition in hot, dry summers. A conspicuous interveinal mosaic observed on *Datura stramonium* growing in the Botanical Garden at Gembloux was found to be due to potato virus X [ibid., xv, p. 738].

In several localities fodder beets became affected during the autumn by a premature yellowing of the leaves and a dry, black rot in the roots. Cultures from affected material gave *F. conglutinans* var. *betae* [ibid., xiv, p. 549], sometimes in association with *Phoma betae*. Inoculations of growing beets with the former organism gave rise to the same symptoms.

Flax was widely and severely affected by *P. linicola* [ibid., viii, p. 106]. Lucerne at Pondrôme was infected by *Rhizoctonia violacea* [*Helicobasidium purpureum*: ibid., x, pp. 670, 800; xv, p. 191] and *Urophlyctis alfalfae* [ibid., xii, p. 177], the latter being a new record for Belgium. *Gloeosporium caulivorum* [*Kabatiella caulivora*: ibid., xv, p. 158] caused a moderate amount of damage to clover. Beans [*Phaseolus vulgaris*] were infected by *Phyllosticta phaseolina* [ibid., ix, p. 274], and carnation rust (*Puccinia arenariae*) [ibid., xi, p. 624] occurred frequently.

Güssow (H. T.). **Progress report of the Dominion Botanist for the years 1931 to 1934, inclusive.**—Canada Dep. Agric., Div. Bot., 86 pp., 1 fig., 1935. [Received July, 1936.]

The issue of this report restores the continuity of the series which has been interrupted for from 1931 to 1934, inclusive. Many of the items noticed have since been published in full elsewhere, reference to the published papers being cited in each instance. Apart from these, the following are of special interest.

F. J. Greaney and J. E. Machacek found that the least amount of root rot of wheat (*Fusarium culmorum* [*R.A.M.*, xv, p. 640] and *Helminthosporium sativum* [ibid., xv, p. 639]) occurred in plots receiving a complete fertilizer where growth was most vigorous. Potassium and phosphorus singly reduced leaf rust [*Puccinia triticina*] while nitrogen was without effect. Nitrogen increased susceptibility to stem rust [*P. graminis*].

Hollyhock rust [*P. malvacearum*: ibid., xiv, p. 38] was found by R. R. Hurst to be effectively controlled in 1932 and 1934 by Bordeaux mixture (4–4–40) plus casein. Lime-sulphur (1 in 60) gave good control but caused some leaf injury while weaker strengths were valueless. Sulphur dust was injurious and inefficacious. Spray applications should be made at intervals of ten days during the growing season.

D. J. MacLeod reports that asters [*Callistephus chinensis*] remained free from yellows when protected by cotton-covered cages; a serious and widespread condition resembling yellows was found in carrots and salsify in New Brunswick in 1933. R. R. Hurst records aster yellows as destructive in Prince Edward Island where the disease is suspected of overwintering in *Leontodon autumnalis*.

An apparently new disease of zinnia is attributed by G. E. Woolliams to a species of *Fusarium* which inoculation experiments showed to be pathogenic at soil temperatures above 30° C. The disease appears when the plants are coming into bloom and is characterized by a sudden wilting of the leaves on a part or the whole of the plant.

In studies on apple scab [*Venturia inaequalis*] J. F. Hockey found that expressed juices of resistant varieties of apples are more toxic to spores of the fungus than juices of susceptible varieties.

Spindle tuber of potatoes [ibid., xv, pp. 247, 460], an important problem in Prince Edward Island, was found by R. R. Hurst in greenhouse tests to be transmitted by rubbing the cut surface of diseased sets against the cut surface of a healthy tuber. The results indicated that this agency is responsible for a great measure of the dissemination of the disease and in field tests in 1933 and 1934, the effectiveness of contaminated sets in spreading spindle tuber was demonstrated, infection

ranging from 1·8 to 11·1 per cent. in plants from sets which after cutting had been shaken up in a basket with freshly cut diseased tubers. Transmission by the cutting knife was effected in 34 per cent. of the sets tested in the greenhouse and 19 per cent. of those grown in the field.

Light soil covering was ascertained by R. R. Hurst to be conducive to the development of late blight [*Phytophthora infestans*]. During October 1932, a survey was made of 32 fields in which an average of 5 per cent. of the plants produced tubers showing through the ground and all of these tubers had contracted blight.

By following a crop rotation of two years in onions, one year in maize, and three in lucerne the amount of infection by *Fusarium* bulb rot of onions [ibid., ix, p. 434; xii, p. 613; xiv, p. 150] was observed by G. E. Woolliams to fall from approximately 40 per cent. to 1 per cent.

In continuation of his work on eggplant wilt (*Verticillium dahliae*) J. K. Richardson found that the application of cyanamide to the soil promises to reduce the amount of disease to a considerable extent. The same author has succeeded in reproducing black heart of celery artificially by subjecting the plants to conditions of abnormal temperature and humidity.

In September, 1933, eggplant fruits were observed by J. K. Richardson with rather large lesions, ½ to 1½ in. in diameter, considerably depressed and covered to within ¼ in. of their margins with a mass of spores of a species of *Alternaria*. The affected tissues were leathery, and extended up to ¾ in. inwards. Successful artificial inoculations have been made both in the field and greenhouse.

SUNDARARAMAN (S.). **Administration Report of the Government Mycologist, Madras, for the year 1935–36 (detailed report).**—13 pp., 1936.

In a test carried out at Coimbatore on the control of foot rot of rice caused by *Fusarium moniliforme* [*Gibberella moniliformis*: *R.A.M.*, xv, p. 740] treatment of artificially infected seed with copper sulphate (1 per cent. for 15 minutes), the same followed by addition of lime water, Bordeaux mixture (2 per cent. for 30 minutes), ceresan (1 gm. per lb.), and control lots gave 4·35, 5·66, 11·51, 1·27, and 29·67 per cent. diseased plants, respectively.

In resistance trials the sugar-cane varieties Co. 326, 229, 335, 355, 356, 508, 413, and P.O.J. 2878 remained unaffected by mosaic, and Co. 411, 412, and 353 showed a high degree of resistance. Inoculations from mosaic recovered (or masked) Co. 361 on healthy Co. 361 and 213 did not cause infection and a similar result was obtained on plants from recovered setts inoculated with virus from diseased Co. 213 cane; it is thought that the plants may have acquired immunity as a result of their previous infection. Attempts to transmit mosaic by seed has so far proved unsuccessful.

Experimental evidence showed that the cheapest and most effective method of seed-bed disinfection against tobacco black shank (*Phytophthora parasitica nicotianae*) [ibid., xv, p. 686] consisted in burning trash on the surface. Silver nitrate solution 1 in 1,000 proved to be the most efficacious seed disinfectant, and spraying about three times with 1 per cent. Bordeaux mixture gave satisfactory protection of seedlings

and transplants. The same methods were equally effective against the damping-off stage.

Macrophomina phaseoli [ibid., xv, p. 705] was isolated from wilted wild horsegram [*Dolichos biflorus*] and was proved to be a virulent parasite on this host in the seedling stage. The same strain was found to infect French bean [*Phaseolus vulgaris*] and black gram [*P. mungo*] but not cowpea [*Vigna unguiculata*], gingelly [*Sesamum orientale*], or Karunganni cotton. Inoculations of horsegram made one, two, and four weeks after sowing gave 100 per cent. infection in the first series and about 50 per cent. in each of the other two. The roots, collar, cotyledonary node, shoots, and leaflets were all equally susceptible, the optimum temperature of infectivity being about 28° C. Numerous pycnidia were present on horsegram stems in nature.

A yellowing of cholam [*Sorghum vulgare*] was proved to be due to a virus transmitted by the insect *Pundalaya simplicia*.

Encouraging results against severe citrus foliocellosis [mottle leaf: ibid., xv, p. 714] were given by spraying with zinc sulphate and hydrated lime (10–5–100). Satisfactory control of fig rust (*Uredo* [*Cerotelium*] *fici*) [ibid., xiv, p. 560] was given by dusting with 300-mesh sulphur. Spraying trials against vine mildew [*Plasmopara viticola*] showed that the addition to Bordeaux mixture of groundnut oil, coconut oil, and neem [*Melia azadirachta*] oil reduced infection to 5·5, 6·5, and 8 per cent., respectively, as against 31 per cent. for Bordeaux mixture with resin and soda. The oils were, in addition, cheaper than resin-soda.

Deighton (F. C.). **Mycological work.**—*Rep. Dep. Agric. S. Leone, 1935*, pp. 22–26, 1936.

This report [cf. *R.A.M.*, xv, p. 343] contains, *inter alia*, the following items of phytopathological interest. In August, 1935, Cavendish bananas [*Musa cavendishii*] on both moist and dry soils at Newton, Sierra Leone, showed bacterial wilt (*Bacterium solanacearum*) [ibid., xiii, p. 788]. *Marasmius stenophyllus* [ibid., xv, p. 165] was recorded for the first time on Cavendish bananas at Freetown. Seedling French beans [*Phaseolus vulgaris*] were affected by a wilt caused by a *Pythium* near *P. myriotylum* [ibid., xiii, p. 599; xiv, p. 473]; the fungus was vigorously pathogenic to unwounded French bean seedlings in the laboratory. *P. coccineus* seedlings were killed by an organism closely resembling *Macrophomina phaseoli* [see preceding abstract]; this species was identified with certainty on old *P. vulgaris* plants in a neighbouring bed. A rot of *Canavalia ensiformis* seedlings just above or below the cotyledons was associated with a *Fusarium* which in culture gave perithecia of *Neocomospora vasinfecta* [ibid., xiv, p. 327]. Rust (*Puccinia penniseti*) [ibid., vii, pp. 231, 712] was newly recorded on *Pennisetum leonis*. Infection was limited to a few leaves and little damage was done.

Citrus scab [*Elsinoe fawcetti*: ibid., xv, p. 575] was present at Njala on 49 per cent. of the total fruit crop, and in addition, some 11,500 young fruits, or about 14 per cent. of the crop, were shed in July, nearly all being badly scabbed. Foster [grapefruit] trees were much more resistant than Marsh. Debuttoning immediately after colouring reduced stem-end rot (*Diplodia*) [?*natalensis*: ibid., xv, p. 495] in

grapefruits by over 75 per cent., the number of rotted fruits out of nearly 9,000 debuttoned grapefruits averaging well under 1 per cent. A few further cases of psorosis [ibid., xv, pp. 343, 574] appeared among late Valencia and Washington Navel oranges; the affected trees were uprooted and burnt.

Gossypium hirsutum and *G. peruvianum* were affected by *Cerotelium gossypii* [*C. desmium*: ibid., xiv, p. 629]. The leaves of *Hibiscus sabdariffa* bore the aecidia of *Aecidium garckeanum* P. Henn., chiefly on the under surfaces; the affected plants were stunted and pale. The fungus was also recorded on the wild *H. surrattensis*. *Myrothecium roridum* [ibid., xiv, p. 428] caused leaf spot of *H. esculentus*, *Luffa acutangula*, *Trichosanthes anguina*, and *Corchorus olitorius*, on none of which was any considerable harm done.

Rice seedlings, especially G.E.B. 24 and Co. 7, were severely attacked by *Piricularia oryzae* [ibid., xv, p. 740], the former variety in nurseries all over the Scarcies; later sowings (made in the wetter period of July and early August instead of in June) escaped severe infection. Ear infection appeared to be rare. *Nigrospora oryzae* was present on the leaves of rice seedlings [ibid., xiii, p. 653], but caused only negligible damage.

A small-sclerotial form of *Corticium solani* was common on ginger [ibid., xii, p. 77] at Njala and elsewhere, being associated with white spots on the leaves, and causing the above-ground parts of the plants to die prematurely.

Minor records included *Cercospora henningsii* on Ceara rubber [*Manihot glaziovii*], *C. stizolobii* on wild *Mucuna pruriens* and cultivated Bengal bean (*Stizolobium aterrimum*), *Choanephora* sp., attacking flowers of *Crotalaria retusa*, and causing a die-back from the seat of infection, *Phytophthora parasitica* in papaw stems, and *Sphaerostilbe repens* in papaw roots, causing wilt.

New records for Sierra Leone were *Cercospora citrullina* [ibid., x, p. 771] on *Citrullus vulgaris*, *Cercosporina ricinella* on *Ricinus communis* [ibid., xii, p. 247], *Septoriella philippinensis* on *Saccharum spontaneum* var. *aegypticum*, *Empusa apiculata* on flies, (?) *E. grylli* [ibid., xv, p. 499] on termites, (?) *Entomophthora aphidis* [ibid., xii, p. 683] on *Aphis medicaginis*, and *Gibellula aranearum* on spiders [ibid., xi, pp. 299, 573].

Virus diseases were recorded for the first time on *Phaseolus lunatus* (rugose and mosaic forms), *Canavalia ensiformis* (mosaic), and yellow yam [*Dioscorea* sp.] (mosaic).

Leach (R.). **Report of the Plant Pathologist.**—*Rep. Dep. Agric. Nyasald, 1935*, pp. 26–28, 1936.

The following items occur in this report [cf. *R.A.M.*, xiv, p. 561]. Three different [unnamed] fungi were isolated from tea branch cankers when these became conspicuous in July, after pruning in May. In inoculation experiments with these fungi many more branches were cankered than had been inoculated; all the bushes heavily pruned immediately before inoculation were badly cankered, those heavily pruned but with three rim lungs left were affected on only a few pruned branches, those lightly pruned were slightly affected, and, finally, those unpruned but inoculated remained healthy. Sections from discoloured

parts of the inoculated bushes yielded no organisms in culture and it is concluded that this form of canker was due to sun scorch of the branches, which had been growing under heavy shade, with minimum ventilation, and hence had developed a comparatively delicate bark. Fungi enter as secondary invaders but only develop until the new shoots grow. It is suggested that the prunings should be left on top of the bushes until the new shoots have grown sufficiently to provide the necessary shade.

Another manifestation of scorching in biennially pruned tea bushes was characterized by a die-back of a large proportion of the central branches. The affected branches showed a clearly defined scorch ring at ground-level.

The spread of *Armillaria* [*mellea*: ibid., xiv, p. 14] root disease in tea is slow in the absence of *Gliricidia maculata* [*G. sepium*], the loppings of which are used as a green manure in some old tea gardens, but when this host becomes infected, the fungus travels freely along the lateral roots, which may cover an area containing 50 tea bushes. The use of *G. sepium* is, therefore, not recommended.

A tobacco leaf spot was caused by *Pleosphaerulina*, possibly *P. argentinensis* Speg.

The causal organism of the coffee disease previously reported [ibid., xiv, p. 561] as resembling one recorded by Storey from East Africa was identified at the Imperial Mycological Institute as *Fusarium lateritium* [var. *longum*].

Borg (P.). **Report of the Plant Pathologist.**—*Rep. Insp. Agric. Malta, 1934–35*, pp. liii–lxi, 1936.

In this report [cf. *R.A.M.*, xiv, p. 618] it is stated that during the period under review 17 citrus trees and 698 pear trees were affected by root rot (*Armillaria mellea*) [loc. cit., and preceding abstract] in Malta. Following a spell of very moist, warm weather in November and December, *Penicillium italicum* developed with extraordinary virulence on all citrus fruits, causing a high percentage of the crop to rot early in the season. Sea spray caused damage to potatoes even in the central parts of Malta; and following heavy rain *Phytophthora infestans* destroyed over one-third of the winter crop. A survey of rose gardens showed over 5,000 bushes to be badly affected by black spot (*Actinonema* [*Diplocarpon*] *rosae*) [ibid., xv, p. 723]. Plots of fenugreek [*Trigonella foenum-graecum*] grown for experimental purposes were severely infected by *Fusarium oxysporum*.

Plant Pathology.—*Rep. Fla agric. Exp. Sta., 1934–35*, pp. 85–95, 4 figs., [1936].

The following items may be noticed from this report [cf. *R.A.M.*, xiv, pp. 563, 564]. Observations by A. N. Brooks and R. C. Nolen showed that in many cases the growth failure or poor conditions of strawberry plants was due to soil reaction, the best reaction under greenhouse conditions being approximately P_H 5·5. Many local growers have profited greatly by correcting their soil acidity before setting their plants. 'Black root' [ibid., xiv, p. 348] was most pronounced in those soils where the P_H value was unsuited to strawberries. Both weakened and healthy plants were killed by a *Diplodia* and two species of bacteria.

A. H. Eddins observed that infection by *Sclerotinia sclerotiorum* of white (Irish) potatoes was epidemic in a few fields planted in December, but dry weather prevented its occurrence in later plantings [cf. ibid., xv, p. 768]. The Katahdin and Bliss Triumph varieties showed outstanding resistance to *Rhizoctonia* injury [*Corticium solani*: ibid., xv, p. 602], as compared with Spaulding Rose and Green Mountain. Seedling stem infection was reduced by planting quickly germinating seed and also by treating the soil with formaldehyde dust.

W. B. Tisdale and S. Hawkins state that warm, dry weather prevented the development of *Phoma destructiva* on the spring tomato crop [ibid., xv, p. 537], and that under these conditions applications of Bordeaux mixture 4–4–50 and of bentonite Bordeaux mixture reduced the yields of marketable fruit, apparently owing to increased transpiration.

A. N. Brooks reports that spraying strawberry plants against *Colletotrichum fragariae* [ibid., xiv, p. 563] with soluble palustrex B [ibid., xiv, p. 519] (15 per cent. copper resinate in an emulsified oil), 1 in 100, and with Bordeaux mixture 4–6–50 plus sodium oleyl sulphate special containing a resin, 1 in 1,000, gave, respectively, increases of 18 and 16 per cent. in the number of plants.

When citrus fruits were treated with various fungicides by W. B. Tisdale and E. West a few hours after picking and stored for four weeks at laboratory temperature, tetra ethyl thiuram monosulphide and a compound containing sodium chlor orthophenylphenate and sodium tetrachlorphenate were at least as effective as borax in preventing decay and caused a less rapid loss of moisture. In many instances these treatments reduced the percentage decay in oranges to less than one-tenth of that in the untreated lots. With grapefruits the reductions in decay while less striking were consistent and significant.

In spraying tests by W. B. Shippey against black spot [*Diplocarpon rosae*: see preceding abstract] on 10 rose varieties the effectiveness of the materials used was as follows (in descending order): Bordeaux mixture, copper-lime dust, ammoniacal copper carbonate, kolodust, florogard dust (sulphur), lime-sulphur, and no treatment.

In the section of this report dealing with the work of the Florida citrus experiment station (pp. 96–100) G. D. Ruehle states that in a grapefruit grove where a normal bloom was set 30 per cent. of the fruits on unsprayed trees became affected by scab [*Elsinoe fawcetti*: see above, p. 778]; one dormant or blossom application of Bordeaux-oil emulsion gave 2 to 5 per cent. scab, while one dormant and one blossom application were slightly more effective. Basic copper sulphate and a proprietary copper-oil were about as effective as Bordeaux, but the second application of the proprietary mixture caused severe fruit burning.

In the section on the work of the Everglades experiment station (pp. 101–131) B. A. Bourne states that tests in various soil types showed the new, promising, early-maturing sugar-cane varieties F. 30–20, 35, 31–669, 304, and 962 to be remarkably resistant to eyespot [*Helminthosporium ocellum*: ibid., xv, p. 606]. Fields of P.O.J. 2714 completely destroyed by *Colletotrichum falcatum* [ibid., xv, p. 607] were replaced by P.O.J. 2725, F. 30–20 and F. 30–35, which have so far remained unaffected.

G. R. Townsend states that common bacterial blight [*Bacterium phaseoli*: ibid., xv, p. 765] of beans [*Phaseolus vulgaris*] appeared on plants raised from seed taken from diseased plants, and spread to plants 90 feet away. It occurred on old and new soil, but appeared to be only seed-borne. Halo blight [*Bact. medicaginis phaseolicola*: see above, p. 766] was uniformly present on old bean land, but absent from 75 per cent. of the new land. Beans growing in saw-grass [*Cladium* sp.] soil in several localities showed evidence of nutritional deficiency; the affected plants recovered their green colour and renewed growth within a week of being sprayed with zinc sulphate solutions of 5–50, 4–50, or 2–50. Most of the unsprayed plants gave no beans. In the last two years mosaic has become serious in a planting of *Amaryllis* [ibid., x, p. 809]; roguing appeared to reduce the number of diseased plants by over 80 per cent. in nine months.

Brown (Nellie A.) & Gardner (F. E.). **Galls produced by plant hormones, including a hormone extracted from Bacterium tumefaciens.**—*Phytopathology*, xxvi, 7, pp. 708–713, 4 figs., 1936.

Red Kidney beans [*Phaseolus vulgaris*], tobacco, sunflower, Paris daisy [*Chrysanthemum frutescens*], privet, and *Impatiens balsamina* all reacted by the production of galls to inoculation with indoleacetic and indolepropionic acids, applied to wounds at the rate of 20 mg. in 1 gm. of a lanoline salve, and with cultures of *Bacterium tumefaciens*, the three first-named hosts giving the most satisfactory results. Tomato and bean stems produced bending and root primordia by surface smearing with the acids without wounding, while galls with root rudiments and witches' brooms were formed on beans as a sequel to decapitating the $\frac{1}{4}$ to $\frac{1}{2}$ in. of stem immediately above the first two primary leaves and smearing the wound with indolepropionic acid. Witches' brooms have also been produced on tomato and geranium [*Pelargonium*] plants by inoculating decapitated stems with *Bact. tumefaciens* cultures. An ethyl ether extract from a *Bact. tumefaciens* culture on a medium of 2 per cent. dextrose, 1 per cent. peptone, a modicum of tryptophane, and the usual inorganic salts was taken up in 0·5 gm. of pure lanoline and applied as described above to bean seedlings and *C. frutescens* stems with positive results, the galls thus induced growing at a similar rate to those caused by smearing with indoleacetic acid [cf. *R.A.M.*, xv, pp. 81, 706].

Bockmann (H.). **Der gegenwärtige Stand der Forschungen über die Fusskrankheiten des Getreides.** [The present status of investigations on the foot rots of cereals.]—*NachrBl. dtsch. PflSchDienst*, xvi, 6, pp. 57–58, 1936.

This is a semi-popular account of the writer's observations (already summarized from other sources) on the environmental factors affecting the development of the two principal forms of foot rot attacking cereals in Germany (especially Schleswig-Holstein), viz., blackleg (*Ophiobolus graminis*) and lodging (*Cercosporella herpotrichoides*) [*R.A.M.*, xiv, pp. 570, 748; cf. also xv, p. 566].

Bockmann (H.). **Untersuchungen über die Schadwirkung von Cercosporella herpotrichoides Fron an Getreide.** [Investigations on the injuriousness of *Cercosporella herpotrichoides* Fron to cereals.]—*Arb. biol. Reichsanst. Land- u. Forstw., Berl.-Dahl.*, xxi, 4, pp. 625–634, 5 figs., 1936.

The results of continued investigations on *Cercosporella herpotrichoides* in Germany [*R.A.M.*, xiii, p. 153, and preceding abstract] showed that the fungus chiefly causes 'lodging' or 'straw-breaking' in winter-sown cereals, among which wheat suffers most from the disease, while rye and barley are rarely attacked very severely, and oats are but slightly affected. Spring cereals are practically immune, presumably owing to the unfavourable weather conditions for the parasite rather than to any resistance of the hosts. In artificial inoculation experiments both in the open and in the greenhouse wheat suffered losses round about 50 per cent., and higher losses were sometimes observed in the fields. Occasionally, however, field losses were inexplicably very slight in spite of heavy initial infection.

Maklakova (Mme G. F.). Оценка значения удобрений и сроков сева в борьбе с ржавчиной зерновых культур. [Estimation of the significance of fertilizers and of the dates of sowing in the control of cereal rusts.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 135–139, 1936.

Brief details are given of experiments in the Voronezh and Leningrad regions in 1935, the results of which again confirm the controlling effect of early sowing of spring wheats on the incidence of rusts (*Puccinia* spp.) [*R.A.M.*, xiv, p. 19]. Organic and mineral fertilizers, on the other hand, had but a comparatively slight effect on rust attack [loc. cit., and above, p. 776], varying with different varieties. Thus, the application of complete mineral fertilizers to the variety Novinka significantly raised the incidence of rust, while with Caesium 111 the tendency, though slight, was towards reducing the amount of rust, and with Lutescens 062 such application gave a distinct lowering of rust incidence. These results would appear to support Gassner's view of a close relationship between the effect of fertilization and rust resistance of the wheat varieties [ibid., xiii, p. 755].

Marland (A. G.) & Kuprianova (Mme V. D.). Закономерности развития корончатой ржавчины (**Puccinia coronifera Kleb.**) Овса в зависимости от метеорологических факторов. [Laws governing the development of crown rust (*Puccinia coronifera* Kleb.) of Oats in dependence on meteorological factors.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 65–67, 1936.

In studies on crown rust of oats (*Puccinia coronifera*) [*P. lolii*] the authors found that the duration of the incubation period varies according to the temperature; thus, with a minimum temperature of 7·2°, mean 10·7°, and maximum 14·3° C., it lasts 14 days, while at 14·6° minimum, 19·3° mean, and 25·1° maximum it is reduced to 7 days. No clear correlation was established between length of incubation and atmospheric humidity. In experiments under constant temperature

conditions, the incubation period of the rust lasted 6 or 7 days at 18° to 20°, and up to 9 days at higher temperatures up to 36°, above which no infection developed. Evidence collected in various parts of the U.S.S.R. indicated the possibility of forecasting outbreaks of crown rust both on *Rhamnus cathartica* and on oats [*R.A.M.*, xv, p. 211 *et passim*].

Boyevski (A. S.). Распространение в посевах инфекции бурой листовой ржавчины Пшеницы. [Distribution in the field of infection by brown leaf rust of Wheat.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 111–116, 1936.

The results of field experiments in 1935 in the Voronezh region showed that spring-sown wheats become infected with brown rust [*Puccinia triticina*] from winter varieties, the spread of the disease occurring earlier (by some 15 days) and infection developing most intensively in the direction of the prevailing winds; both the incidence and intensity of the rust decreased markedly as the distance from the infection focus increased. In a second paper [pp. 116–118] the author states that *Thalictrum* spp. do not appear to play any part in the spring renewal of brown rust, as aecidia on this host only appear towards the middle of June, while sporulating uredosori were already present on wheat on 14th May. There was also clear evidence that local infection foci of crown rust (*Puccinia coronifera*) [*P. lolii*] persist during winter and serve to renew the rust in the spring both on oats and on *Rhamnus cathartica*.

Schliephacke. **Die Gefahren des Weizenbaus und ihre Verhütung.** [The dangers threatening Wheat cultivation and their avoidance.] —*Dtsch. landw. Pr.*, lxiii, 27, pp. 337–338, 2 figs., 1936.

The writer has observed that the dark green coloration of the leaves and stems of wheat varieties susceptible to the brown and yellow rusts (*Puccinia triticina* and *P. glumarum*) is due to the presence on these organs of numerous densely aggregated, fat-exuding hairs to which the spores adhere much more firmly than in the case of the pale green varieties with stiff haulms, narrow laminae, and relatively few hairs, e.g., *Triticum polonicum*. Crosses between the latter and a local Silesian wheat resulted in very resistant progeny. Recent observations by Lieske indicate that the use of raw lignite as a fertilizer reduces the incidence of rust in wheat [see above, p. 783].

Naoumova (Mme N. A.). Зависимость развития желтой ржавчины Пшеницы от метеорологических факторов. [Dependence of the development of yellow rust of Wheat on meteorological factors.]—*Summ. sci. Res. Wk Inst. Pl. Prot.. Leningr., 1935*, pp. 64–65, 1936.

The author experimentally determined that the length of the incubation period of yellow wheat rust (*Puccinia glumarum* f. *tritici*) varies from 8 to 22 days within a range of temperatures between —1° and 26° C., and tends to be shorter as the general trend of the daily tempera-

tures rises; on wheat plants carrying overwintered intramatrical mycelium of the rust, pustules may be formed in the spring at temperatures as low as 2° to 4°, and may eventually reach maturity. Infection by yellow rust in the spring requires either the presence of drops of water on the leaves or relative air humidities near the saturation point. The length of the incubation period and the dates of the subsequent outbreaks of infection may be determined with the help of nomograms [*R.A.M.*, xv, pp. 522, 562].

Кікоіна (Mme R.). Ржавчина Пшеницы в Азово-Черноморском и Северо-Кавказском краях и меры борьбы с нею. [Wheat rusts in the Azoff–Black Sea and North Caucasus regions, and their control.] —*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 101–103, 1936.

In the Azoff–Black Sea and North Caucasus regions brown wheat rust [*Puccinia triticina*] has been found usually to overwinter as mycelium in wheat plants, but in very cold and snowless winters, the rust is killed; black rust [*P. graminis*], however, has never been found in these areas overwintering on the cereals, and barberries play an important part in the renewed spring infection of this rust. Experiments in 1933 showed that eight sulphur dustings (at the rate of 40 kg. per hect.) of wheat during the season reduced the amount of rust from 11·3 to 4·1 per cent. at the earing, from 50·7 to 18·6 per cent. after the flowering, and from 66 to 46·6 per cent. at the milky maturity stages; the treatment increased the number of wheat grains in the ear by 21 per cent., and the yield by 84·4 per cent. [cf. *R.A.M.*, xiv, p. 18].

Gurevitch (M. J.), Kuprianoff (V. A.), & Proyda (P. A.). Мероприятия по борьбе с головней хлебных злаков в северных условиях. [Measures employed under northern conditions for the control of cereal smuts.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 144–147, 1936.

From a survey of the results of laboratory and field investigations in 1934 in the Leningrad region the authors conclude that the best control of wheat bunt [*Tilletia caries* and *T. foetens*] was obtained by treating the seed-grain with either full-strength AB dust (1·5 gm. per kg.) [*R.A.M.*, xiv, p. 47], PD dust containing 10 per cent. arsenious oxide (0·75 gm. per kg.), magnesium arsenite plus 3 per cent. acidol [ibid., xv, p. 565] and 5 per cent. arsenious oxide [dose not indicated], A_{10}, B_{10}, and B_{12} dusts (1·5 gm. per kg.), or formalin-treated peat (17·7 per cent. formalin) at the rate of 7·5 gm. per kg. (the treated wheat is kept covered with sacks or tarpaulins for two hours). Evidence was obtained that in the north the moisture content of cereal seed-grain at the time of sowing is an important factor in the amount of bunt in the ensuing crop; thus, spring Novinka wheat grain with 17·9 per cent. moisture produced 13·3 per cent. bunt, while that with 13·5 per cent. moisture only gave 1·1 per cent. bunt. Yarovization [vernalization; ibid., xv, pp. 489, 708] of spring wheat grain reduced the amount of bunt from 13 to 0·9 per cent., and artificial infection of the vernalized wheat grain only increased the amount of bunt to 1·4 per cent.

Gorlenko (M. V.). Испытание протравителей и способов протравливания семян хлебных злаков против головни. [Tests of seed disinfectants and seed disinfection methods for the control of cereal smuts.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 150–152, 1936.

The amount of bunt [*Tilletia caries*] in wheat raised from seed-grain artificially infected with bunt spores (0·1 per cent. by weight) was reduced from 35 per cent. in the control to 1 and 0·7 per cent. when the seed-grain was dusted with magnesium arsenite [see preceding abstract] at the rates of 0·75 and 1 gm. per kg. seed, respectively. Dusting the infected wheat grain with double superphosphate [*R.A.M.*, xv, p. 432] at the rate of 6 gm. per kg. reduced the bunt to 3 per cent. In tests with millet [*Panicum miliaceum*] smut [*Ustilago panici-miliacei*: *R.A.M.*, xv, p. 646] dusting the infected seed with magnesium arsenite (1 gm. per kg.) reduced the smut from 54·3 per cent. in the control to 5·4 per cent., and it is believed that higher doses of the fungicide may give better control. Very good control (0·15 per cent. as against 10·6 per cent. in the untreated grain) of loose smut of oats [*U. avenae*] was obtained by mixing smutted oat seed-grain with formalin-treated peat (10 gm. per kg.) and keeping the seed covered with sacks for two hours.

Ryzhkova [Ryjkova] (Mme Z. F.). Влияние удобрения на проявление твердой головни на яровой Пшенице. [Influence of fertilizers on the appearance of bunt on spring Wheats.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 134–135, 1936.

The results of experiments in the Voronezh region during the cold and rainy spring of 1935 showed that sowing Caesium 0111 wheat seed-grain, artificially infected with bunt spores [*Tilletia caries* and *T. foetens*], immediately over superphosphate (60 kg. per hect.) or sylvinite (30 kg.) drilled into the soil delayed the emergence of the seedlings by six days and considerably reduced the density of the stands; the plants only caught up with the controls after the flowering stage. The incidence of bunt was 86 per cent. on the control, 35 per cent. on the superphosphate plot, and 63·3 per cent. on the sylvinite plot.

Lobik (V. I.) & Dahlstrem (A. F.). Уточнение лабораторной методики проращивания спор мокрой головни. [Improvement of methods for the germination of Wheat bunt spores in the laboratory.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 177–178, 1936.

Excellent results were obtained in toxicity tests of fungicides against wheat bunt (*Tilletia tritici*) [*T. caries*] by germinating the spores on disks of white blotting paper on the surface of a layer of soil of known composition and moisture content in small Petri dishes which are then incubated at determined temperatures, the advantage of this method being that on the white ground the germination of the bunt spores is visible to the naked eye. The optimum temperature for germination of *T. caries* spores was found to be 15° to 18° C. and the optimum soil humidity 40 to 50 per cent. [cf. *R.A.M.*, iii, p. 512]. At 25° only a few

spores germinated, while at 5° germination was abundant but lasted much longer (7 or 8 days), and was much depressed by humidities above 20 to 30 per cent. Light did not affect germination. Of the liquid media tested the best germination of *T. caries* was obtained in 0·05 or 0·1 per cent. calcium nitrate solution and in tap water. The results of another series of experiments indicated that freshly collected spores of *Ustilago hordei*, *U. avenae*, and *U. panici-miliacei* do not germinate as freely in the laboratory as spores that are kept for several days at room temperature [ibid., xiii, p. 749]. The temperature ranges for germination were 5° to 30° for *U. avenae* (optimum 15° to 25°) [ibid., iii, p. 128; vi, pp. 399, 411], 5° to 32° for *U. hordei* (optimum 15° to 25°), and 10° to 35° for *U. panici-miliacei* [see above, p. 786] (optimum 22° to 30°).

GASSNER (G.) & KIRCHHOFF (H.). **Die Bedeutung der Wasseraufnahme des Weizenkorns, insbesondere des Weizenembryos, für Wirkung und Wirkungsweise der Warmwassertauch- und benetzungsbeize.** [The significance of the water absorption of the Wheat seed-grain, especially of the Wheat embryo, in relation to the effect and mode of action of the hot-water immersion and moistening methods of disinfection.]—*Phytopath. Z.*, ix, 3, pp. 229–258, 9 graphs, 1936.

The fungicidal treatment of wheat seed-grain by moistening in closed vessels [*R.A.M.*, xiii, p. 750] has been found to lend itself particularly well to the detailed observation of the process of water absorption by the seed-grain and its individual components, especially the embryo, in relation to temperature conditions. Both this process and its sequel, the gradual migration of the absorbed water from the embryo to the endosperm, are strongly influenced by the prevailing temperature, the maximum absorption being reached after 8, 4, and 1½ to 2 hours, respectively, at pre-soaking temperatures of 1°, 10°, and 20° C., respectively, and after 1 hour at 30°. The impairment of germination resulting from the subsequent treatment of the seed-grain by rotation of the containers in water at temperatures upwards of 50° for varying periods is more marked after a medium duration of pre-soaking than after either a long or a short one. A lengthy period of pre-soaking, involving as it does the gradual transference of the water content of the embryo to the endosperm, was found to enhance the efficacy of the treatment against loose smut (*Ustilago tritici*) [see next abstract].

Similar considerations are applicable to the treatment of the seed-grain by immersion in hot water, except that in this case matters are simplified by the absence of any modification in the water content of the embryo due to the migration of moisture into the endosperm. In order to ensure absolute elimination of infection by 10 minutes' treatment at 52°, 65 to 70 parts of water (calculated as a percentage of the dry matter) must be taken up by the embryo. In both methods the pre-soaking temperature operates indirectly by influencing the velocity and the course of the accompanying changes in the embryo, and not, as suggested by Appel and Riehm (*Arb. biol. Reichsanst. Land- u.*

Forstw., Berl.-Dahl., viii, p. 343, 1911), by any specific action on the mycelium of the fungus.

Kuprianoff (V. A.) & Proyda (P. A.). Испытание термического протравливания в борьбе с пыльной головней в северных условиях. [Tests of the hot-water disinfection of Wheat seed-grain in the control of loose smut under northern conditions.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 153–154, 1936.

The results of tests in 1935 in the Leningrad region showed that seed-grain of the spring wheat Novinka infected by loose smut (*Ustilago tritici*) and containing from 14·2 to 20 per cent. moisture, may be safely subjected, after pre-soaking, to hot-water treatment [*R.A.M.*, xv, pp. 636–637 and preceding abstract] at 52° C. for 8 minutes, and at 53° for 7 minutes; slightly longer steeping (by up to 2 minutes) may result in a slight decrease in the germinability of the grain (by up to 5 per cent.), and in a considerable reduction in the vigour of growth of the seedlings. Grain with higher moisture content should be possessed of normal germinability before treatment, since less viable seed may give much reduced stands after treatment. Seed-grain of Wiener barley containing 15·3 per cent. moisture did not show any reduction of viability after the usual period of hot-water treatment. Vernalization [see above, p. 785] of wheat seed-grain had no controlling effect on the development of loose smut.

Tupenevitch (S. M.). Оценка сроков посева и яровизации яровых Пшениц в борьбе с фузариозным заболеванием. [Estimation of the effect of dates of sowing and of vernalization of winter Wheats on the control of *Fusarium*-induced diseases.]—*Summ. sci Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 126–128, 1936.

The results of experiments from 1932 to 1935 in various parts of central and northern Russia showed that wheat seedlings germinated at a temperature of 8° to 10° C. developed considerably more vigorously and formed a much heavier root system than those germinated at 18° to 24°, and in soil artificially infected with *Fusarium graminearum* [*Gibberella saubinetii*: *R.A.M.*, xv, p. 640] the former were much less severely attacked by the fungus than the latter. It was also shown that at 5·6° to 10·6° *G. saubinetii*, *F. culmorum* var. *lethaeum* [*F. culmorum*], and *F. avenaceum* [loc. cit.] grew much more slowly in pure culture than at 18° to 25°. In the field early-sown spring wheats were only slightly attacked by *Fusarium* sp., while later-sown ones suffered much more both in the seedling and subsequent stages of growth. Vernalization [see preceding abstract] of 18 wheat varieties hastened the germination of seed-grain, increased the density of the stands, and decreased the amount of infection of the seedlings with *Fusarium* spp. Vernalization of *Fusarium*-infected wheat grain, however, decreased its viability and reduced the density of the resulting stands by from 25 to 75 per cent., but disinfection of the infected seed with germisan or the preparation AB [see above, p. 785] before vernalization considerably reduced the losses due to this cause.

Tupenevitch (S. M.), Butylina (Mme V. I.), Lissitzina (Mme M. L.), & Ostreykovski (M.). Оценка сортов яровой Пшеницы на устойчивость к фузариозу. [Evaluation of spring Wheat varieties for resistance to *Fusarium*-induced diseases.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 139–141, 1936.

A summarized account is given of greenhouse experiments, in which the resistance of a number of spring wheat varieties to *Fusarium culmorum* var. *lethaeum* [*F. culmorum*], *F. avenaceum*, *F. graminearum* [*Gibberella saubinetii*: see preceding abstract], and *Helminthosporium sativum* [*R.A.M.*, xv, p. 639] was tested in soil inoculated with pure cultures of the fungi. The results, supported by field observations in various districts of central and northern Russia, showed that the *lutescens* variety Africa (VIR 25652), the *ferrugineum* varieties Huron and Finnland (28314), and the variety Aurora 1774 suffered very little *Fusarium* injury to the ears, while *Triticum timopheevi* [ibid., xv, p. 352] was almost entirely immune from it. A fairly high correlation was established between the degree of attack of the grain by *Fusarium* spp. and its water content at the milky and waxy stages of maturity. The varieties Erythrospermum 01/78, Leda 47, Milturum 0321, and Sarrubra showed a higher degree of resistance to foot rot caused by *H. sativum* than Caesium 0111.

Gorlenko (M. V.). Оценка сортов яровой Пшеницы на устойчивость к фузариозу, мучнистой росе и бурой ржавчине. [Evaluation of spring Wheat varieties for resistance to *Fusarium*-induced diseases, powdery mildew, and brown rust.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 141–143, 1936.

The 59 lines of wheat belonging to several botanical species and varieties which were tested in 1935 at Voronezh fall into four groups according to their degree of resistance to foot and ear attack by *Fusarium avenaceum*; besides the varieties enumerated in the preceding abstract, the resistant group also includes Caesium 0111, Milturum 0321, and 0274, Preston, Kazanskaya 1/1[a], Germania 19138, Uzbekistan 7264, *Triticum spelta* var. *vulpinum*, and *T. dicoccum* 250. Field observations during the epidemic outbreak of *Erysiphe graminis* in 1935 showed that *T. timopheevi*, *T. monococcum*, *T. persicum*, *T. polonicum*, *T. turgidum*, and the soft wheat varieties Preston, Germania 19138, Finnland 28314, Tulun ZA/32, Australia 13274, and Aurora 1774 remained entirely immune, while all the durum wheats (except Syria 17139), and among the soft wheats Garnet DS–12, Argentina 146797, 146800 and 146808, Africa 25652, SASSh 25665, and *T. dicoccum* var. *farrum* were highly resistant (not over 10 per cent. infection). No brown rust (*Puccinia triticina*) infection was found on *T. timopheevi*, *T. monococcum*, *T. turgidum*, or on the varieties Africa 25652 and SASSh 25665.

Tupenevitch (S. M.) & Shirko (V. N.). Изучение условий гибели озимых от выпревания. [Investigation of the conditions conducive to winter killing of winter-sown cereals.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 143–144, 1936.

After a brief reference to the very considerable losses in the U.S.S.R.

caused in autumn-sown cereals by the so-called winter injury (usually attributed to *Fusarium nivale* [*Calonectria graminicola*] but the rôle of which is uncertain, and other species of *Fusarium*), the authors give a concise summary of experiments, the results of which indicate that the injury may be effectively controlled, if not completely suppressed, by cultural measures calculated to prevent the accumulation and retention of excessive moisture in the soil in the autumn and the spring, as well as by sowing resistant wheat varieties, such as Moskowskaya A–27 and 2411, and Durable. Adequate soil fertilization appeared to increase the resistance of all the varieties tested to winter injury.

LEUKEL (L. W.). **Factors influencing infection of Barley by loose smut.** —*Phytopathology*, xxvi, 7, pp. 630–642, 1936.

Further studies on the factors governing infection of barley (Alpha and Wisconsin Pedigree varieties) by *Ustilago nigra* [*R.A.M.*, xv, p. 641] indicated that soils with a high percentage of saturation are generally unfavourable to the development of the fungus, especially at 5° and 30° C., while a relatively dry soil promoted infection at 5°. At temperatures between these extremes differences in soil moisture from 30 to 55 per cent. saturation did not seem to affect the incidence of *U. nigra*, fairly high percentages of infection by which were secured from 10° to 25°, with an optimum at 15° to 20°, the minimum and maximum being below 5° and above 30°, respectively. *U. nuda*, on the other hand, showed little or no reaction to temperature fluctuations. Plants grown to emergence at 30° and then transferred to a soil temperature of 13° contracted less infection by *U. nigra* than those maintained at 30° until near heading. Plants transferred at emergence from a temperature of 13° to either 5° or 30° showed a highly significant decrease of infection compared with those kept at 13°; similarly, those removed at emergence from 5° to 13° or 30° showed a marked increase of disease compared with the series maintained at the lower soil temperature. Infection by *U. nigra* was experimentally shown not to occur after the emergence of the first leaf.

McKAY (R.). **Method of infection of Oat grain with Ustilago avenae and the influence of external factors on the incidence of the disease.**— *Sci. Proc. R. Dublin Soc.*, N.S., xxi, 27–34, pp. 297–307, 1 pl., 1936.

In experiments carried out in Ireland from 1933 to 1935 Potato oats inoculated with loose smut (*Ustilago avenae*) either at and immediately after flowering, or by contamination of seed-grain, both with hulls intact and removed, were sown in two successive years under identical conditions and the amounts of infection compared.

In the first year the flower-inoculated oats gave the highest percentage infection in one experiment only. In the second season shelled grain contaminated before sowing gave the most infection, followed by grain contaminated with the hulls intact, and then by the flower-inoculated oats.

Dehulling flower-inoculated oats reduced infection by from 35 to over 50 per cent. [*R.A.M.*, xv, p. 711]. Washing grain with hulls intact derived from flower-inoculated oats reduced infection by from 32 to 56 per cent. Dehulling and washing flower-inoculated oats reduced

infection by from 62 to 79 per cent. in the case of a pure line strain of loose smut, and by from 90 to 96 per cent. in the case of mixed strains. It is concluded that most of the infection shown by the flower-inoculated oats was due to ungerminated spores within the glumes, and not to resting mycelium [cf. ibid., ii, p. 214; xii, p. 431].

During winter, examination of artificially flower-inoculated oats and grain from naturally smutted crops revealed both resting mycelium and viable ungerminated spores within the glumes, sufficient of the latter being present to account for any infection appearing in the following crop.

Rivier (A.) **Essais comparatifs de traitement du charbon nu de l'Avoine.** [Comparative trials of the control of Oat loose smut.]—*Rev. Path. vég.*, xxiii, 3, pp. 215–229, 3 graphs, 1936.

Full details are given of experiments on the control of *Ustilago avenae* carried out on oat seed of the Noire d'hiver de Belgique variety from 1933 to 1935 in France. The seed was inoculated with *U. avenae* at the rate of 1 gm. per kg. and sown on various dates after treatment with formalin (2·5 parts per mille for 20 mins.) or different dusts. In both years complete control was given by the formalin treatment for all sowings. The dusts used in 1933–4 (cupric chloride and talc, 10 : 90; copper sulphate and talc, 25 : 75; and basic copper carbonate ($CuCO_3 3CuO$), alum, and talc, 25 : 25 : 50, all at the rate of 350 gm. per q.) completely failed to give satisfactory control, while in 1934–5, dusts of similar composition but modified proportions were unsatisfactory and commercial dusts B and P were not effective at the rates recommended.

Marschner (G.). **Die Dörrfleckenkrankheit. Eine bisher wenig beachtete Haferkrankheit der schweren Bruchböden.** [Grey speck disease. An as yet little regarded Oats disease of heavy fallow soils.]—*Dtsch. landw. Pr.*, lxiii, 23, p. 288, 1936.

Some improvement has been effected in the condition of oats suffering from grey speck [*R.A.M.*, xv, p. 356 and next abstract] in heavy fallow soils by application to the soil of potassium nitrate (100 to 200 kg. per hect.), followed by rolling. Manganese sulphate at a similar rate may also prove helpful, more plentiful applications being desirable in the case of soils with a strongly alkaline reaction (P_H 7 and upwards). Preventive measures include the choice of lighter soils, with the application of a physiologically acid ground and top dressing, the admixture of some rye or barley (where conditions are suitable) with the oats, and a judicious scheme of crop rotation so as to avoid the development of the excessive alkalinity liable to accompany the sugar beet-wheat-barley sequence.

Rademacher (B.). **Gibt es gegen Dörrfleckenkrankheit widerstandsfähige Hafersorten?** [Are there any varieties of Oats resistant to grey speck?]—*Dtsch. landw. Pr.*, lxiii, 29, p. 362, 2 figs., 1936.

In connexion with the varietal trials of some 170 selections of oats for their reaction to grey speck [see preceding abstract] conducted by the writer in two localities of Schleswig-Holstein, one on bog and the other on sandy humus soil, growers are warned not to judge exclusively by external symptoms, which may or may not be accompanied by

reduced yields, while conversely, the latter feature is not necessarily reflected in the outward appearance of the plants. Of the officially approved German varieties included in the tests, Rotenburg Black and Black President showed a conspicuous degree of resistance not shared by any of the white or yellow types, among which the most promising were Fischers Wirchenblatter III, Fichtelgebirgs, Lembkes Baldur, Lischower Early, Lüneburger Kley, Peragis, and Heines Silver. Resistant foreign varieties were Svalöfs St. 01320 and 01340 and Engelbrecht II, Glocken [Bell] II and III, Grand Mogul, Orion II, Weibulls Argus, Fyris, and Melöj III (all Swedish), Lyngby Heath (grey) and Borries (Danish), Nopsae I (Finnish), Black President (Dutch), Garton's Scotch Potato, Vilmorin's Siberian Early and Black Ligowo-Brie (French), and Burt (American). Referring to the efficacy against grey speck of ammonium sulphate and superphosphate, the writer states that the latter is surpassed by basic slag, the superiority of which is presumably due to its relatively substantial manganese content.

RADEMACHER (B.). **Die Heidemoorkrankheit (Urbarmachungskrankheit) unter besonderer Berücksichtigung der Kupferfrage.** [The heath moor disease (reclamation disease), with especial reference to the copper question.]—*Arb. biol. Reichsanst. Land- u. Forstw., Berl.-Dahl.*, xxi, 4, pp. 531–603, 7 figs., 4 maps, 1936.

The author briefly reviews the results of investigations up to date on the incidence, geographical distribution, and the causes of the so-called reclamation disease of various crops in Europe [*R.A.M.*, xiv, pp. 254, 575; xv, p. 493], and states that of all the suggestions advanced to explain its causes, that of copper deficiency appears to be the most likely. Heath moor soils are usually poor but not entirely deficient in copper, the balance of evidence obtained in special tests showing that copper is present in quite appreciable quantities, but in a form unavailable to plants; humus appears to be especially responsible for the fixation of the copper, the fixing substances in it apparently being tannin, lignin, and humic acids. Copper deficiency in such soils is further increased by the cultivation of removable crops, and may be remedied by growing meadow grasses or green manure crops, especially of deep-rooted plants that help to dissolve and bring up the fixed copper from the lower to the upper soil levels. The incidence and severity of the disease appear to be inversely correlated with the amount of water supply in the soil, but are independent of the soil reaction; there was evidence, however, that copper applications were not effective in the control of the trouble in soil with a reaction unfavourable for the relative crop. Excess lime also appeared to inhibit the curative effect of copper applications. Nitrogen applications led to an increase in the severity of the disease; potassium, on the other hand, was beneficial; while magnesium had no specific effect. No evidence was forthcoming that excess phosphorus played any important part in the disease. The cases in which grey speck of oats followed the application of copper are possibly explained by the assumption that the soils in question are also deficient in manganese, the symptoms only appearing after the copper deficiency has been remedied. While the symptoms of the disease in low-lying moors differ

somewhat from those on higher ground, the fact that in such moors increased yields are obtained from copper applications would indicate that there also the trouble is due, in part at least, to copper deficiency.

The main crops are divided into three classes according to their susceptibility; white and yellow oats, winter and summer barley, and wheat are very strongly susceptible; black moor oats, four-rowed barley, cruciferous crops, carrots, field peas, broad beans (*Vicia faba*), yellow lupins (*Lupinus luteus*), and red clover (*Trifolium pratense*) are moderately to slightly susceptible; and rye, potatoes, *V. villosa*, *Ornithopus sativus*, white clover (*T. repens*), *Lotus uliginosus*, *Spergula arvensis*, and buckwheat are slightly susceptible to immune. Apart from the usual symptoms, in fields which begin to suffer from copper deficiency the affected cereal crops may only show an unfavourable straw to grain ratio which is very often attributed to other causes. There was evidence of specific and varietal variations in susceptibility of the different crops, which may be useful to geneticists for the production of resistant strains.

The trouble is amenable to control either by agricultural methods directed towards releasing and rendering available the fixed copper in the soil or, in very severe cases, by the application of copper compounds (chiefly copper sulphate) to the soil, and spraying affected cereal plants with cupric solutions.

The paper terminates with a bibliography of 133 titles.

Boewe (G. H.). **The relation of ear rot prevalence in Illinois Corn fields to ear coverage by husks.**—*Plant Dis. Reptr*, xx, 10, pp. 165–172, 2 graphs, 1936. [Mimeographed.]

From a five-year survey [the statistical data of which are tabulated] in Illinois of the correlation between maize ear rot and the extent of coverage of the ears by the husks, it appears that infection by smut [*Ustilago zeae*: *R.A.M.*, xv, p. 572], *Fusarium moniliforme* [*Gibberella moniliformis*: ibid., xv, p. 494], and *Penicillium* [ibid., xiv, p. 232; xv, p. 360] is favoured by imperfect coverage, whereas complete coverage assists invasion by *Diplodia* [*zeae*: ibid., xv, p. 290] and *G.* [*saubinetii*: ibid., xv, p. 360]. This factor exercised no appreciable influence on the incidence of infection by *Rhizopus*, *Aspergillus* [ibid., xiv, p. 232], and *Basisporium* [*Nigrospora* sp.: ibid., xv, p. 574]. The average percentage of prevalence of *G. moniliformis* during the period under review was 40·7, the corresponding figures for *Penicillium*, *Rhizopus*, *U. zeae*, and *D. zeae* being 5·8, 3, 1·7, and 1·2, respectively, while the other diseases caused under 1 per cent. infection.

Edwards (E. J.). **Maize seed selection and disease control. The problem of internal seed-borne infection.**—*Agric. Gaz., N.S.W.*, xlvii, 6, pp. 303–306, 5 figs., 1936.

In Australia the principal organisms producing rotting of the cob and grain tissues of maize are *Gibberella saubinetii* [*R.A.M.*, xv, p. 644], *G. moniliformis*, *G. fujikuroi* var. *subglutinans* [ibid., xv, p. 359], these three fungi causing *Fusarium* rot, and *Diplodia zeae* [ibid., xi, pp. 157, 778; and preceding abstract], responsible for dry or *Diplodia* rot. After briefly describing the symptoms produced by the four organisms the

author discusses the problem of control and points out that owing to the prevalence of internal, seed-borne infection no grain can be selected as entirely free from potential disease-producing organisms. The fungi causing the chief maize diseases are not always seed-borne, and may live over from season to season on old diseased stalks and plant refuse left in the field after harvesting. Hence, the control of these diseases depends primarily on thorough field sanitation, including the regular burning of the old stalks and systematic crop rotation, combined with which seed selection is of unquestionable value. Experiments in seed treatment with organic mercury dusts were instituted in 1935.

Ullstrup (A. J.). **The occurrence of Gibberella fujikuroi var. subglutinans in the United States.**—*Phytopathology*, xxvi, 7, pp. 685–693, 2 figs., 1936.

The occurrence of *Gibberella fujikuroi* var. *subglutinans* on old maize stalks [see preceding abstract] is reported from Ohio and New Jersey, and the morphological and cultural characters of the fungus are described in considerable detail. The author inclines to the view that the fungus is a recent introduction into the United States.

Girton (R. E.). **Sterilization of Corn grains with sodium hypochlorite.**—*Plant Physiol.*, xi, 3, pp. 635–639, 1 fig., 3 graphs, 1936.

Fungal infection [species unspecified] of Krug yellow dent maize seed-grain was reduced from 13 to 2 per cent. in one experiment by 5 hours' immersion in a solution of commercial sodium hypochlorite [cf. *R.A.M.*, xii, p. 743; xiii, p. 781]; there was, however, a corresponding depression of germination from 100 to 80 per cent. These results were in general confirmed by a second trial in which a marked reduction of infection (from 11·5 to 1·75 per cent.) resulted from a suction injection treatment involving the rapid removal of air bubbles from the grains; this was followed by shaking for 2½ hours.

Uppal (B. N.) & Weston (W. H.). **The basis for merging Sclerospora indica with Scl. philippinensis.**—*Indian J. agric. Sci.*, vi, 3, pp. 715–719, 1 pl., 1936.

An account is given of the writers' comparative studies on living and preserved material of *Sclerospora indica* and *S. philippinensis* [*R.A.M.*, xv, pp. 283, 546] from maize, whence it appears that in all essential features the two species are identical. In both the total conidiophore length ranges from 150 to 410 μ (usually 300 to 350 μ), the maximum diameter of the main axis is 20 to 25 μ, the basal cell measures 80 to 100 by 9 to 11 μ, and the sterigmata average 14 to 15 μ. The conidia of both fungi are elongate-ellipsoid, elongate-ovoid, or rotund-cylindrical; in respect of length frequencies, 60 per cent. of the Indian material falls within the range of 33 to 41 μ, and 65 per cent. of the Philippine measures 31 to 39 μ, while the width frequencies overlap practically throughout the entire range of spore measurements. The slightly narrower tendency of *S. indica* has been tentatively attributed by E. J. Butler in recent correspondence to the variability inherent in geographical races of the same fungus. Taking all these points into consideration, there seems to be no adequate reason for the maintenance

of *S. indica* as a distinct species, and its inclusion within *S. philippinensis* is therefore proposed.

CHOWDHURY (S. C.). **A disease of Zea mays caused by Colletotrichum graminicolum (Ces.) Wils.**—*Indian J. agric. Sci.*, vi, 3, pp. 833–843, 2 pl. (1 col.), 1 graph, 1936.

The writer describes the morphological, pathogenic, and cultural characters of *Colletotrichum graminicolum* [*R.A.M.*, xv, p. 558], the agent of a maize disease at Pusa characterized by the presence on the leaves of small, brownish spots, originating on the upper side of the central midrib and gradually elongating in both directions, so that they often reach from the leaf sheath to the tip. The centres of the spots turn straw-coloured and bear the minute, black, circular or oval acervuli of the fungus, which have only been obtained in small numbers in culture on maize and oatmeal agars. Under the relatively poor conditions for growth prevailing in artificial culture *C. graminicolum* forms numerous dark brown, mostly spherical or piriform appressoria, 8 to 15 μ in diameter, frequently showing a clear, white spot (the so-called 'germ-pore') near the centre. Conidial germination is favoured by high humidity and the presence of sugar or of living plant tissues, the optimum temperature for the process being 25° to 30° C.

All parts of the plant were shown by inoculation experiments to be susceptible to invasion by *C. graminicolum*, which further infected in the laboratory barley, oats, wheat, sorghum, *Panicum typhoideum*, *Eleusine indica*, *Setaria italica*, *Euchlaena mexicana*, *P. frumentaceum*, and *Paspalum scrobiculatum*. The strain of the fungus from sorghum was found to be capable of infecting maize, and vice versa.

UPPAL (B. N.) & KAMAT (M. N.). **Gummosis of Citrus in Bombay.**—*Indian J. agric. Sci.*, vi, 3, pp. 803–822, 3 pl., 2 graphs, 1936.

Mosambi oranges (*Citrus sinensis*) in the Bombay Deccan are stated to suffer extensively from gummosis, caused by a typical strain of the 'rubber group' of *Phytophthora palmivora* [*R.A.M.*, xiii, p. 77; xiv, p. 627; xv, p. 482], the morphology of which is fully described. The disease, which is most prevalent during the rains and very destructive in young plantings, attacking 20 to 25 per cent. of the trees, is characterized by copious exudations of resin and cracking of the cortex of the trunk for considerable distances upwards from the bud union, but a more serious aspect of the trouble lies in the lateral spread of infection. Mosambi fruits (and those of santra or mandarin, *Citrus nobilis* var. *deliciosa*, lying on the ground) are also liable to invasion by the fungus and develop brown rot. Details are given of inoculation experiments with fragments of *P. palmivora* mycelium from oatmeal agar cultures on different *Citrus* species which showed varying resistance.

Gummosis may be prevented by grafting sweet, commercial citrus varieties on a sour resistant stock, such as jamburi. Neither soil nor irrigation water should be brought into contact with the bud union, through which infection from these sources may penetrate the cortical tissue. Promising results were also given by decortication, followed by the application to the exposed surface of 25 to 30 per cent. creosote oil, and if necessary, by painting with coal-tar.

La gommose parasitaire des Aurantiacées, Phytophthora parasitica Dastur. [Parasitic gummosis of the Aurantieae, *Phytophthora parasitica* Dastur.]—*Memento Direc. Agric., Rabat*, 35, 7 pp., 1 pl., 1 fig., 1935. [Received October, 1936.]

A brief, popular account is given of the symptoms, causal organism, losses caused by, and control of parasitic gummosis of citrus in Morocco where the disease is caused by *Phytophthora parasitica* [*R.A.M.*, xv, p. 575]. The use of resistant stocks such as *Citrus bigaradia* [*C. aurantium*] or *C.* [*Poncirus*] *trifoliata* and the usual methods of control are recommended.

Rhoads (A. S.). **Blight—a non-parasitic disease of Citrus trees.**—*Bull. Fla agric. Exp. Sta.* 296, 64 pp., 2 figs., 1936.

A full account is given of a twelve years' study of the non-parasitic blight of citrus that has been present in Florida for over 50 years. The disease occurs sporadically throughout a large part of the citrus area, but is of major importance at present only in a few localities.

A careful survey in a badly affected area in 1924 showed that out of 919 trees inspected, 44·4 per cent. were blighted or had been removed because diseased, the corresponding figures for two other localities being 41·8 and 59·3 per cent. The disease not only destroys hundreds of fine trees annually in Brenard County, but the replacement of the declining trees results in the presence of trees of different ages in the groves, the market value of which is consequently much reduced.

Blight takes the form of a chronic wilt and decline, usually starting on one side of a tree, and progressing until the whole top is affected. If it develops early in the season, the affected branches die, and the fruit withers and falls before reaching maturity. If the affected branches do not die too early the fruit may reach maturity, but much is below commercial size and of a strongly acid flavour. Blooming is greatly delayed, and may be abnormally heavy, in which case the blossoms are small and weak, and the branches soon wither and die. The spring flush of growth is delayed and generally reduced in amount. When the decline is slow, the larger, defoliated branches may put forth a sparse new growth late in spring, which, except for the watersprouts developed from the upper trunk and lower main limbs, is small and under-sized. The leaves are small and dingy green. Watersprouts develop after half to two-thirds of the crown has died, and grow vigorously for a time, but wilt during prolonged drought, though they are the last part of the crown to die.

No causal organism has been found, and the condition is not contagious or transmitted by budding or grafting. The evidence indicates that it is caused by extreme fluctuations of soil moisture, including both deficits of moisture on the lighter soils and excesses on the poorly drained one and combinations of the two. The physical structure of the soil, kind of rootstock, and grove management are regarded as contributing factors.

A similar but less frequent wilt and decline of citrus, included under the composite term blight, is attributed to droughty periods following unusual rise in the water-table not only in poorly drained low soils but also in low places in upland soils.

No adequate method of control is known, but it is suggested that in planting new groves unsuitable land should be avoided, underlying rock should be removed and hard pan broken up, adequate drainage should be provided, irrigation adopted or, in its absence, the cover crop should be mown, the best cultural practice should be followed, and ground furrowed on contour lines to reduce running-off of surface water.

McGeorge (W. T.). **Some aspects of Citrus tree decline as revealed by soil and plant studies.**—*Tech. Bull. Ariz. agric. Exp. Sta.* 60, pp. 329–370, 3 graphs, 1936.

The Arizona soils in which citrus (orange and grapefruit) trees are affected by chlorosis [*R.A.M.*, xiv, p. 561; xv, p. 496] and 'crazy top' were found to be generally above the average in P_H value. Leaf analyses showed a lower calcium and higher water-soluble alkalinity of ash in the foliage suffering from chlorosis and allied physiological disturbances, such as mottle leaf [ibid., xv, p. 714], as compared with normal material. The ash of juice from fruit produced by diseased branches showed an abnormally high water-soluble alkalinity, hydrogen-ion concentration, and total acidity, indicating a higher buffered state. Judging by experimental observations on maize, buckwheat, and cow-peas, lower calcium and higher water-soluble alkalinity appears to be a feature of plants growing on alkaline-calcareous soils. Encouraging results have been given by the application of sulphur to trenches at the base of the trees at the rate of 25 to 50 lb. per tree and by the incorporation of sulphuric acid with the irrigation water at the rate of 8 lb. per tree, and the practical possibilities of a commercial extension of these methods are discussed.

A condition locally known as 'pink nose' was observed in 1934 to be characterized by the same general chemical relationships as those found in the foregoing nutritional disorders. The fruit was of poor keeping quality, but the leaves, as in the case of 'crazy top', were not chlorotic.

Winston (J. R.). **A method of harvesting Grapefruit to retard stem-end rot.**—*Circ. U.S. Dep. Agric.* 396, 8 pp., 6 graphs, 1936.

Investigations begun several years ago in Florida to determine whether citrus fruits instead of being clipped from the trees can safely be pulled, thereby separating the source of infection by stem-end rot (*Diplodia natalensis* [*R.A.M.*, xv, p. 499] and *Phomopsis* [*Diaporthe*] *citri* [ibid., xv, p. 717]) on the twigs from the fruits and reducing the risk of disease, showed that the rind of tangerines tears too easily for pulling to be practicable, while oranges can be successfully pulled only while fully ripe, but grapefruit can be pulled at almost any time. Pulled grapefruit, unless very ripe, was less rapidly affected by stem-end rot than clipped fruit, three years' tests showing that after 30 days storage at 70° F. the pulled and clipped fruit had, respectively, about 14 and 40 per cent. decay, the corresponding figures for borax-treated fruit being about 12 and 25 per cent. When the fruit was held at 55° the amount of decay after 60 days for the clipped untreated, clipped borax-treated, pulled untreated, and pulled treated fruits was, respectively, about 44, 27, 19, and 13 per cent. Pulling was also cheaper and quicker than

clipping, did not increase blue mould [*Penicillium italicum*], and was acceptable to the trade.

MORSTATT (H.). **Kaffee-Schädlinge und -Krankheiten Afrikas. (Fortsetzung.)** [Coffee pests and diseases in Africa. (Continuation).]—*Tropenpflanzer*, xxxix, 7, pp. 273–299, 15 figs., 1936.

This is a continuation of the writer's summary of the available information on coffee pests and diseases and their control in Africa [*R.A.M.*, xv, p. 577], the relevant sections of which have been noticed in this *Review* from other sources.

MAYNE (W. W.). **Annual Report of the Coffee Scientific Officer, 1935–1936.**—*Bull. Mysore Coffee Exp. Sta.* 14, 21 pp., 1936.

In further studies carried out in Mysore on the inheritance of resistance to *Hemileia vastatrix* in coffee [*R.A.M.*, xv, p. 16] a number of plants apparently resistant to both strains of the fungus were later found to be infected with a third strain. The indicator plant S. 5 was susceptible to strain 2 only, 288·45 to strain 3 only, 288·23 to none, while 288·5 was susceptible to all three strains. The evidence indicated that strain 3 is relatively uncommon. A large number of plants appear to be of the type of 288·23, and resistance to strain 3 also seems to be common among Kents. The simple one factor inheritance of resistance to strain 1 was confirmed, and further evidence was obtained that the inheritance of resistance to strain 2 is governed by two factors, one of which is probably the same as that governing inheritance of resistance to strain 1.

The conclusion previously reached [loc. cit.] that die-back is primarily a secondary disease following unfavourable conditions and that defoliation predisposes to it was confirmed. Examination of dead shoots showed clearly that in nearly every case decay had begun at the second or third node from the apex, where the leaf scars were much smaller than usual indicating leaves of the dwarfed type characteristic of flush in dry weather. The defoliation was probably caused by the extremely hot, dry weather, with less than 1 inch of rain in March, April, and May. The finer rootlets of the die-back plants had been killed off extensively. *Colletotrichum* [*coffeanum*] and several common saprophytes were present, but the evidence showed that the former, which occurs on the surface of quite healthy coffee shoots, is absent from the interior of the internodal tissue, thus further supporting the view that infection by *C. coffeanum* is secondary to predisposing factors.

The results obtained since 1930 with different spray materials against *H. vastatrix* showed no definite differences in effectiveness between plain Bordeaux mixture, fish oil-resin soap Burgundy mixture, resin-soda Bordeaux mixture, linseed oil Bordeaux mixture, and casein Bordeaux mixture. Furthermore, no satisfactory evidence of increased efficiency by the addition of vegetable oils was forthcoming and the writer concludes that adhesives and spreaders can safely be omitted from the Bordeaux spray. Further experiments made to ascertain the effects of varying the time of spraying again showed that locally the pre-monsoon application is essential and the second spray of minor importance.

Mundkur (B. B.). **Resistance of American Cottons to Fusarium wilt in India.**—*Proc. Indian Acad. Sci.*, iii, 6, pp. 498–501, 1936.

Cotton wilt (*Fusarium vasinfectum*) [*R.A.M.*, xiv, p. 358] is stated to be common on light, sandy, acid soils of P_H 5·5 to 5·9 in the United States, whereas in India the fungus is confined to black clay soils of P_H 7·6 to 8.

In pot tests at Dhawar the American fungus proved to be quite incapable of attacking the Indian and Indo-American cottons. In similar tests at Ames, in the United States, the Indo-American cottons on American cotton soils proved to be as susceptible to the American fungus as the American cottons, but were still immune from the Indian fungus, indicating a strict specialization on the part of the fungus, the American form being unable to attack Indian cottons, and vice versa. Indian cottons on American soils are much less susceptible to the Indian form than in India. Apart from specialization, environmental factors are considered to affect pathogenicity markedly. The virulent American strain became almost non-pathogenic to the American and Indo-American varieties in Indian soils, whereas the Indian strain only weakly attacked Indian cottons in American soil. This difference in behaviour is attributed to the different textures and acidities of the two soils.

Gulati (A. N.). **A note on a new type of progressive damage to the structure of Cotton hair caused by micro-organisms.**—*Indian J. agric. Sci.*, vi, 3, pp. 861–865, 2 pl., 1 fig., 1936.

In connexion with a study on the etiology of deterioration in Broach cotton, the writer describes a hitherto apparently unrecorded form of damage consisting in the internal disintegration and corrosion of the cell wall, leaving only the cuticular sheath intact. The injury originates in infection at the basal end of, or at a tear in, the fibre by micro-organisms, of which about 17 species of fungi [cf. *R.A.M.*, xiv, p. 585] and three of bacteria, to be described in a later publication, were isolated from the affected samples.

Разработка системы мероприятий по защите от вредителей и боленей Хлопчатника в старых Хлопковых районах. [Development of the systematic control of Cotton pests and diseases in old-established Cotton-growing districts.]—*Summ. sci. Res. Wk Inst. Pl. Prot. Leningr., 1935*, pp. 217–248, 1936.

Most of the papers included in the section of this report, dealing with the control of cotton diseases, give details of investigations in 1935 of the physiology of cotton wilt, which, in south-east Russia and in Central Asia is stated to be chiefly caused by *Verticillium dahliae* [*R.A.M.*, xiii, p. 369; xv, p. 577]. A. S. Letoff found that the microsclerotia of *V. dahliae* germinated most abundantly (90 to 100 per cent.) in saccharose solutions with osmotic pressures between 7 and 10 atmospheres (0·3 to 0·4 mols saccharose), and that the osmotic pressure of the cell sap in the collar of native cotton varieties [*Gossypium herbaceum*] is of the same order at the stage of growth (flowering) when they are most susceptible to *V. dahliae* attack, while that of the cell sap of the highly

resistant, if not immune. Egyptian cottons is markedly higher. He suggests the possibility of raising the resistance of susceptible varieties by the application of adequate mineral fertilizers, a suggestion based on the facts that cotton plants growing in soils with high [common] salt content have a cell sap with higher osmotic pressure than normal, and that such plants were never seen to be attacked by the fungus. Preliminary tests indicate that the osmotic pressure of other host plants of the fungus lies within the range of the osmotic pressures at which the microsclerotia germinate freely, while that of species immune from it (monocotyledons) is invariably considerably higher.

In experiments recorded by Mme A. M. Ermeyeva it was found that under favourable environmental conditions and in the presence of sufficient inoculum cotton plants are liable to infection by germinating microsclerotia of *V. dahliae* in the soil from the time when the stems begin to become lignified to the end of the vegetation period. Under the peculiar weather conditions of 1935, which favoured a profuse but etiolated growth of the cotton plant, infection of the basal parts, revealed by the dark discoloration of the vascular tissues, was not reflected in the aerial organs, which showed no wilting. Such latently infected plants constitute a serious danger from the standpoint of the perpetuation of soil infection with *V. dahliae*.

According to Mme V. A. Yablokova, it was experimentally shown that both susceptible (native and American Upland) and resistant (Egyptian) cottons can be infected with *V. dahliae* through wounds at the cotyledonary first leaf stage, but that such early infections do not usually spread to any considerable extent in the host tissues, only traces of vascular discoloration being found later in both the susceptible and resistant hosts. At the flower bud formation stage infection of the susceptible varieties resulted in a widespread invasion of the host vessels both longitudinally and radially, the mycelium penetrating the vascular system of the leaves. A preliminary series of tests showed that spores of *Fusarium buharicum* [ibid., xv, p. 577] sprayed on cotton seedlings only penetrated the unwounded host cortex at the collar, from which the mycelium then spread to the pith.

PETCH (T.). **New and rare Yorkshire fungi.**—*Naturalist. Lond.*, *1936*. pp. 57–60, 1936.

Of 11 fungi collected in Yorkshire included in this annotated list *Sphaeroderma fusisporum* n. sp. [with a Latin diagnosis] found on *Spicaria* (*Isaria*) *farinosa* [*R.A.M.*, xiii, p. 574] on a pupa is characterized by orange, later black, globose, astomate perithecia up to 0·3 mm. in diameter, which later develop a papillate ostiole and subsequently a collar round the orifice, but no setae. The asci measure 66 by 12 μ and the lanceolate, fuliginous, obtuse or truncated spores 20 to 24 by 6 to 9 μ. For an *Entomophthora* found on aphids at North Wootton and Barnard Castle and also received from America the author adopts the name *E. planchoniana* Cornu and proposes to rename in a forthcoming paper the American fungus referred by Thaxter to this species *E. thaxteriana*. The spore of Cornu's species is the shape of the old German spiked helmet. *Fusarium arenaceum* [ibid., xv, p. 649], determined by Reinking and Wollenweber, was found on an aphid. *Hirsutella*

aphidis n. sp., also collected on an aphid, is characterized by conidiophores laterally borne on the hyphae, up to 55 μ high, with a conical base about 20 μ high, 3 μ in diameter, and gradually attenuated into a long sterigma. The lemon-coloured spore cluster measures 10 by 5 to 6 μ, the individual conidia being cymbiform or oval, obtuse at the end, hyaline, continuous, and 6 to 10 by 1·5 to 2 μ.

Imai (S.). **Studies on the Hypocreaceae of Japan. II.**—*Trans. Sapporo nat. Hist. Soc.*, xiv, 2, pp. 101–106, 1 fig., 1935. [Received 1936.]

This annotated list of 11 Japanese Hypocreaceae records *Cordyceps clavicipiticola* Tokunaga & Imai n. sp. parasitic on *Claviceps* sclerotia in the glumes of *Sasa paniculata* Mak. & Shib.; it is characterized by simple or branched, clavate or capitate stromata, 4 to 13 mm. high, subglobose or oblong, sometimes compressed, ochraceous or vermilion heads, 1 to 4 mm. in diameter; a straight, smooth, white or sulphur-yellow stalk; ovoid perithecia, 170 to 230 by 100 to 150 μ; and cylindrical asci, 100 to 150 by 2·4 to 3·6 μ, containing eight filiform, multiseptate, hyaline ascospores.

Shanor (L.). **The production of mature perithecia of Cordyceps militaris (Linn.) Link in laboratory culture.**—*J. Elisha Mitchell sci. Soc.*, lii, 1, pp. 99–104, 1 pl., 1936.

The author obtained mature perithecia of *Cordyceps militaris* [*R.A.M.* xii, pp. 216, 567] on normal fruit bodies of the fungus in culture, by inoculating living pupae of *Basilona imperialis* and *Callosamia promethia* with mycelium from pure cultures of the organism, and by incubating them in a moist chamber with damp filter paper or in sterilized sphagnum moss. No perithecial stromata were produced on pupae that had been autoclaved before inoculation or on various media, though the fungus grew rapidly on the latter. The size of the fruit bodies varied with the size of the pupae and the number of stromata produced.

Tanaka (R.). **The effect of formalin as a disinfectant against the aquatic fungus which attacks the eggs of the Pond Smelt.**—*Trans. Sapporo nat. Hist. Soc.*, xiv, 2, pp. 138–141, 1935. [Received 1936.]

A species of *Saprolegnia* responsible for destructive epidemics in pond smelt (*Hypomesus olidus* Pallas) hatcheries in Japan [cf. *R.A.M.*, viii, p. 720; xii, p. 93] was satisfactorily controlled by the immersion for 30 minutes at three-day intervals (i.e., five times during the incubation period) of fertilized eggs of the fish in a 1 in 200 formalin bath, which reduced the mortality rate from 45·03 to 5·24 per cent.

Anderson (Joan A. T.). **Gall-midges (Cecidomyidae) whose larvae attack fungi.**—*J. S.-E. agric. Coll., Wye*, xxxviii, pp. 95–107, 1936.

This comprehensive, annotated list of the species of Cecidomyidae whose larvae have been reported in various parts of the world to feed on, or to be associated with, fungi, includes *Mycodiplosis coniophaga* and *M. reaumuri* living on *Phragmidium subcorticium* [*P. mucronatum: R.A.M.*, xv, p. 506] on rose leaves, *M. gymnosporangii* found in the deformities produced on the branches of *Juniperus sabina* by *Gymno-*

sporangium clavariaeforme [ibid., xiv, p. 533], *M. melampsorae* living on the spores of *Melampsora 'salicina'*, *M. poriae* living on the spores of *Poria vaillantii* [ibid., viii, p. 3; ix, p. 78], and *M. tremulae* living on *Melampsora tremulae* on poplar leaves [ibid., xv, p. 618].

Dermatoses parasitaires d'origine végétale. [Parasitic dermatoses of vegetable origin.]—*ex* Nouvelle Pratique Dermatologique, Tome II, pp. 99–634, 15 pl. (14 col.), 261 figs., 5 diags., 2 maps, Paris, Masson et Cie, 1936.

The section on mycotic dermatoses of this monumental treatise on practical dermatology, the entire eight volumes of which comprise over 7,350 pages and 2,425 illustrations, contains fully documented chapters by Sabouraud, Gougerot, Langeron, and other specialists on the numerous forms of human disease associated with fungal infection. The present edition is designed to replace the 'Pratique Dermatologique' published in four volumes in 1900.

Memmesheimer (A. M.). **Beobachtungen über das epidemische Auftreten von Pilzerkrankungen in der Industrie.** [Observations on the epidemic occurrence of fungous diseases in industry.]—*Klin. Wschr.*, xv, 6, pp. 206–208, 1936.

During the last three or four years there has been a marked recrudescence of industrial mycoses in Germany, where they have been more prevalent than at any time since the world war and the period immediately following it. In this connexion particulars are given of two epidemics, in one of which (in a mine) Kaufmann-Wolf's *Epidermophyton* [*R.A.M.*, xv, p. 580] was ascertained to be the agent of the disease, affecting some 10 per cent. of the 2,000 workers employed.

Todd (Ramona L.) & Herrmann (W. W.). **The life cycle of the organism causing yeast meningitis.**—*J. Bact.*, xxxii, 1, pp. 89–97, 1936.

The writers report the isolation, from the spinal fluid of two male patients and from subcultures of eight other cases, of what is believed to be the perfect stage of the organism commonly known as *Torula histolytica* or following Benham, *Cryptococcus hominis* [*R.A.M.*, xv, pp. 153, 222]. A revision of the classification of the organism is thus necessitated and the following system of nomenclature is proposed. The ten strains of yeast meningitis conform to the description of the genus *Debaryomyces* Kloecker (*C. R. Lab. Carlsberg*, vii, p. 273, 1909) and the spore-forming strains of *C. hominis* (*T. histolytica*) [*Torulopsis neoformans*] should therefore be known as *D. hominis* (Vuillemin) Todd & Herrmann n. comb. The globose to ovoid vegetative cells measure up to 10 μ in diameter and are enclosed in a capsule. On Sabouraud's maltose or glucose agar (P_H 7) at 20° to 37° C., budding continues for six weeks or more under moist conditions, and is followed by the development of two types of cells, one spherical, thick-walled, 5 to 8 μ in diameter, each containing a large globule staining with Sudan III and osmic acid, and sometimes furnished with protuberances up to 3 or 4 μ in length, the other thinner-walled, spherical to ovoid (generally the latter), with several small, spherical bodies in the granular cytoplasm, and also frequently provided with tubes of varying length. On

two occasions fusion between these two types of cells was observed to be effected by means of the tube-like projections; other preparations indicated that the contents of the thin-walled cell passed to the thick-walled, giving rise directly to an ascus, containing a single, globose or slightly oval spore, fairly thick-walled, 7 to 11 μ in diameter, filled with up to 22 globules (commonly 14 to 18), and germinating by budding.

Allen (F. R. W. K.) & Dave (M. L.). **The treatment of rhinosporidiosis in man based on the study of sixty cases.**—*Indian med. Gaz.*, lxxi, 7, pp. 376–395, 5 figs., 1936.

A very comprehensive account, based on the detailed study of 60 Indian cases, is given of the etiology, taxonomy, pathological effects, distribution, mode of infection, diagnosis, and therapy of rhinosporidiosis (*Rhinosporidium seeberi*) [*R.A.M.*, xv, p. 446] in man; the disease is also stated to affect cattle and equines. Diagnosis consists in the observation of minute, white sporangia on the surface of the exfoliative, non-infiltrating granulomata in the nose, throat, and elsewhere and the detection of the spores, with their 10 to 16 refringent spherules, in stained smears of the secretion therefrom. The treatment of the disease is discussed.

Karunaratne (W. A. E.). **The pathology of rhinosporidiosis.**—*J. Path. Bact.*, xlii, 1, pp. 193–202, 7 pl. (1 col.), 1936.

During the last 13 years the writer has personally investigated in Ceylon 34 cases of rhinosporidiosis (*Rhinosporidium seeberi*) [see preceding abstract], which is so far represented in the relevant literature by only 53 records altogether. An account is here given of the structure and life-history of the parasite (based on Ashworth's monograph) [*R.A.M.*, iii, p. 153], supplemented by observations by the writer and others on the histology and morbid anatomy of the associated lesions, the clinical characters of the disease, and the mode of infection, with a brief note on the occurrence of rhinosporidiosis in animals.

Lefrou (G.) & Querangual des Essarts (J.). **Contribution au diagnostic des faux lépreux (deuxième mémoire). Les macules dyschromiques d'épidermomycose.** [A contribution to the diagnosis of cases of pseudo-leprosy (second memoir). The dyschromic plaques of epidermomycosis.]—*Bull. Soc. Path. exot.*, xxix, 7, pp. 743–749, 1936.

Clinical details are given of ten cases of Madagascan natives whose symptoms, simulating those of leprosy, were found to be associated with infection by *Malassezia furfur*, the agent of pityriasis versicolor [*R.A.M.*, xv, p. 295]. The diagnostic significance of these observations and the therapy of the condition are briefly discussed.

Ciferri (R.) & Baldacci (E.). **Acremoniella (Allescheriella) tarchiniana n. sp. isolata da una lesione nodulo-gommosa del solco sottomammario.** [*Acremoniella* (*Allescheriella*) *tarchiniana* n. sp. isolated from a nodular-gummous lesion of the sub-mammary sulcus.]—*Atti Ist. bot. Univ. Pavia*, Ser. IV, vii, pp. 329–339, 6 figs., 1936. [Latin and English summaries.]

From a nodular-gummous lesion of the sub-mammary sulcus of a

female patient a fungus was isolated which in culture formed a dense, cottony, later gypsum-coloured growth, with hyaline hyphae, 1·5 to 2·5 μ in diameter, cylindrical, septate, frequently short conidiophores constricted at the apex and 2 to 4 μ in diameter, and piriform to spheroidal, brown, thick-walled aleurochlamydospores, 9 to 13 by 8 to 10 μ, which were not observed to germinate. It is considered to belong to *Acremoniella*, agreeing with *Allescheriella*, regarded by the authors as a sub-genus of *Acremoniella* and is named *A.* (*Allescheriella*) *tarchiniana* n. sp., with a Latin diagnosis.

Carrión (A. L.). **Chromoblastomycosis: a new clinical type caused by Hormodendrum compactum.**—*Puerto Rico J. publ. Hlth*, xi, 4, pp. 663–682, 8 pl., 1936.

This is an amplified account of the new clinical type of human chromoblastomycosis caused by *Hormodendrum compactum*, and of the cultural and morphological characters of the fungus, a preliminary report on which has already appeared [*R.A.M.*, xv, p. 219].

Mougneau (R.) & Le Coulant (P.). **Myringomycoses dues à 'Sterigmatocystis nigra'.** [Myringomycoses due to *Sterigmatocystis nigra*.]—*Gaz. hebd. Sci. méd.*, lvii, 2, pp. 19–21, 5 figs., 1936. [Abs. in *Bull. Inst. Pasteur*, xxxiv, 16, pp. 787–788, 1936.]

A fungus of the *Sterigmatocystis nigra* [*Aspergillus niger*] type was isolated from a number of cases in the Hérault and neighbouring departments of France of mycosis of the external auditory canal [cf. *R.A.M.*, xii, p. 631]. The whitish or greyish accumulations at the base of the canal were sprinkled with typical black points, and were found to consist of epithelial débris mixed with a thick weft of large, regular, septate hyphae of the fungus.

Pinoy (P. E.). **Les mycoses de la rate.** [Mycoses of the spleen.]—*Rev. Path. comp.*, xxxvi, 474, pp. 367–374, 1936. [Abs. in *Bull. Inst. Pasteur*, xxxiv, 16, pp. 785–786, 1936.]

Aspergillus fumigatus, *A. jeanselmei* [*R.A.M.*, iii, p. 95], *Sterigmatocystis* [*A.*] *nantae* [ibid., xii, p. 445], and *Madurella mycetomi* are among the organisms responsible for mycoses of the spleen in animals, the last-named resulting in a black-grained mycetoma when inoculated into cats. In man the involvement of fungi in the causation of splenomegaly has been disputed, but from spleens with Gandy-Gamna nodules the writer has repeatedly isolated an *Aspergillus* close to *A. versicolor* in the *nidulans* group [ibid., vii, p. 782] and more recently a smoky-grey species with rounded 'heads' resembling those of *A. niger* but smaller. The brownish-yellow bodies of variable morphology found in the Gandy-Gamna nodules (from which alone fungi have been isolated) are believed to be old mycotic elements infiltrated by lime, while slender mycelial hyphae are also present; the former also develop as a sequel to inoculation with the smoky-grey *Aspergillus*. These results are considered to point to primary fungal implication in the etiology of splenomegaly.

Sharvelle (E. G.). **The nature of resistance of Flax to Melampsora lini.**—*J. agric. Res.*, liii, 2, pp. 81–127, 8 figs., 2 diags., 2 graphs, 1936.

In investigations described in detail in this paper on flax rust

(*Melampsora lini*) [*R.A.M.*, xv, p. 369] which causes in the United States an annual loss of approximately 2 per cent. of the total yield of seed flax, it was shown that the varieties of cultivated flax may be classified as immune (designated type 0), highly resistant (1), resistant (2), incompletely susceptible (3), and completely susceptible (4), and that varietal resistance cannot be attributed to any one single factor alone but is rather due to a combination of a number of different factors. Histological studies of the uredo stage on the different types indicated that the physiological properties of the host may be a factor in resistance or susceptibility; this view was supported by the fact that plant extracts varied in their ability to maintain the vegetative growth of uredospores in hanging drop cultures in accordance with the resistance or susceptibility of the plants from which they originated. The thickness of the epidermal membrane of leaves and stems may also be of considerable importance in the formation of uredosori and the liberation of the uredospores, since it was shown that the leaf and stem epidermis of varieties resistant to or immune from rust requires a significantly greater pressure to effect a puncture than that of certain susceptible varieties. A correlation was further found between the presence of a thick cuticle, the development of a hypodermis, and the isodiametric shape of the epidermal cells and the resistance of the epidermal membrane to puncture. No correlation, on the other hand, was established between rust resistance and the size, shape, and arrangement of the cortical fibres. The number of stomata and their functioning may be of significance in resistance, since it was found that the variety Bison, the stomata of which did not open until after the disappearance of dew from the leaves, developed very little rust in the field. The fact that in soil infected by *Fusarium lini* [ibid., xv, pp. 369, 652] flax plants usually fail to be rusted even in the presence of abundant inoculum, may possibly be due to the atrophy of the guard cells, and additional evidence of the part played by stomatal movements in rust resistance is that darkness during the incubation period apparently suppressed the development of the disease. Excess nitrogen and excess phosphate tended to increase rust development, and excess potassium to suppress it.

WATANABE (T.) & TAKESAWA (M.). **Studies on the leaf-spot disease of the Hemp.**—*Ann. phytopath. Soc. Japan*, vi, 1, pp. 30–47, 4 figs., 1936. [Japanese, with English summary.]

Septoria cannabis [*R.A.M.*, xv, p. 97] first appears on hemp (*Cannabis sativa*) foliage in Japan during the early summer, producing ellipsoidal or polygonal, yellowish- to greyish-brown spots, mostly on the basal leaves, and gradually spreading during the warm weather of June and July, so that premature defoliation often ensues.

The flat or spherical, light brown, ostiolate pycnidia, 27·5 to 115·5 μ in diameter, are usually immersed in the palisade tissue of the upper leaf surface. The filiform, straight, or slightly curved, smooth, hyaline, usually triseptate pycnospores measure 12 to 46 by 2 to 3 μ. In culture the pycnidia are brown to black and attain 85 to 465 μ in diameter. The most suitable media for mycelial growth and pycnidial formation were found to be, respectively, potato decoction agar and hemp decoction or soy agar. The minimum, optimum, and maximum

temperatures for mycelial growth were shown to be below 9°, 25°, and about 35° C., respectively. Mycelial development took place on Richards's solution at a hydrogen-ion range of P_H 1·8 to at least 9·8 and with an optimum at 5·2. On the same medium the highest percentage of pycnospore germination occurred at P_H 4·2 to 8·2, the proportion being low at 2·2 and moderate at 9·8 and above.

Positive results were given by inoculation experiments on hemp leaves with the pycnospores of the fungus from hemp decoction agar, the incubation period of the leaf spot in September being about six to seven days.

GITMAN (L.) & BOITSCHENKO [BOYTCHENKO] (E.). **Zur Frage der Verschiedenheit der zwei Septorien des Kendyrs Septoria littorea Sacc. und Septoria apocyni Chochrjak.** [On the question of the divergence of the two *Septoriae* of Kendir, *Septoria littorea* Sacc. and *Septoria apocyni* Chochrjak.]—*Phytopath. Z.*, ix, 3, pp. 337–347, 5 figs., 4 graphs, 1936.

A comparative study was carried out on *Septoria littorea* Sacc. and *S. apocyni* Chochrjak. [Khokryak.], the agents of leaf and stem spots of kendir fibre (*Apocynum venetum*) in U.S.S.R. [*R.A.M.*, xiii, p. 377], the morphological and cultural characters of which were not found to show sufficient differences to justify specific separation. The average spore length of *S. littorea* on dead kendir stems was 52 μ and that of *S. apocyni* 32 μ, while in cross-inoculation tests with the former on the stems and with the latter on the leaves the corresponding dimensions were 44 and 43 μ, respectively. *S. apocyni* further caused a brown discoloration and disorganization of the infected tissues, with incipient pycnidial formation at the line of demarcation between phloem and wood, while *S. littorea* remained confined to the phloem parenchyma layer adjoining the epidermis. On the basis of these studies *S. apocyni* is reduced to the rank of a form of *S. littorea* as *S. littorea* f. *apocyni*.

PAPE (H.). **Die Praxis der Bekämpfung von Krankheiten und Schädlingen der Zierpflanzen. Zweite Auflage.** [The practice of control of diseases and pests of ornamental plants. 2nd Edn.]—viii+427 pp., 8 col. pl., 297 figs., 6 diags., Berlin, P. Parey, 1936. Price RM. 18.

This second edition of the author's manual on disease and pest control in ornamentals, first issued in 1932 [*R.A.M.*, xi, p. 245], owes its appearance to the great increase both of theoretical and practical knowledge in the field covered by the treatise, necessitating extensive revision, the amplification of various sections, and the addition of over 30 illustrations.

KAWAMURA (T.). **Weiteres Studium über die Sklerotienkrankheiten der Tulpen unter besonderer Berücksichtigung von Scl. rolfsii Sacc.** [A further study on the sclerotial diseases of Tulips with special reference to *Scl. rolfsii* Sacc.]—*Ann. phytopath. Soc. Japan*, vi, 1, pp. 1–14, 1 fig., 1936. [Japanese, with German summary.]

Tulip bulbs in Japan are stated to be liable to infection by *Sclerotium rolfsii* (with which *S. tuliparum* [*R.A.M.*, viii, p. 725; x, p. 524; xv,

p. 632] is believed to be identical), *Botrytis cinerea* [ibid., v, p. 669], and *B. tulipae* [ibid., xv, p. 656].

At least eight strains of *S. rolfsii* [ibid., xv, p. 401] were differentiated on tulips, nearly all varieties of which appear to be uniformly attacked. Mostly negative results were given by inoculation tests with the tulip strains on a number of other flowering bulbs, but it was possible to infect crocus, *Scilla*, and hyacinth buds in process of development. The outcome of inoculation trials on tulip bulbs with the same strains was positive in every case. A new procedure for determining the longevity of the sclerotia consists essentially in leaving these bodies under controlled conditions for certain fixed periods and then transferring both whole and halved sclerotia to new media.

Wenzl (H.). **Epidemisches Auftreten von Botrytis parasitica Cav. auf Tulpen.** [The epidemic occurrence of *Botrytis parasitica* Cav. on Tulips.]—*Neuheiten PflSch.*, xxix, 3, p. 96, 1936.

The damp spring of 1936 was attended by the most destructive outbreaks of *Botrytis tulipae* (*B. parasitica*) [see preceding abstract] on outdoor tulips ever witnessed in Austria. Tens of thousands of plants were killed in Vienna nurseries alone; in one field only a minute fraction of the 100,000 tulips could be utilized for the market. The fungus ordinarily arrests growth and induces rotting in young plants or flower buds, but in the present instance the fully developed buds, opening blossoms, and leaves were attacked. Of outstanding importance in the control of the disease are transference to a fresh site and the use of healthy bulbs, the disinfection of which with 0·5 per cent. uspulun has given good results.

Wilhelm (A. F.). **Eine für Deutschland neue Bakterienkrankheit an Begonien.** [A bacterial disease of Begonias new to Germany.]—*NachrBl. dtsch. PflSchDienst*, xvi, 6, pp. 58–60, 3 figs., 1936.

Two pink begonia varieties in German nurseries have been affected by a bacterial leaf disease characterized by 'grease spots' of variable shape and often confluent; the diseased portions of the foliage turn yellowish-green and eventually become brown and necrotic. Infection frequently proceeds from the leaf margins, but may also originate along the veins, or at the leaf axes or scars, leading to petiole and stem invasion; in the last-named case the stem turns black and finally collapses. It is obvious that the resulting loss of leaves weakens the plants and renders them both unmarketable and practically useless for propagation. Severely diseased plants are completely destroyed.

The causal organism, isolated in pure culture on bouillon agar, is a non-motile, Gram-negative rod, 1·8 to 2·8 by 0·4 μ, forming canary-yellow colonies with a fatty, glistening aspect and liquefying gelatine. Inoculations with bacterial suspensions gave positive results on begonia leaves, from which the agent of the leaf spot was recovered. The incubation period of the disease under moist conditions in the greenhouse in June and July was 7 to 9 days, 10 in a heated greenhouse (25° C.) in December (when negative results were obtained at 8° to 13°), and 6 in February at 25°. Control measures are briefly indicated. The identity or otherwise of the present disease with that affecting

begonias in Denmark and Holland [*R.A.M.*, xv, p. 228] is not yet established.

LAUBERT (R.). **Eine neue Begonienkrankheit.** [A new Begonia disease.] —*NachrBl. dtsch. PflSchDienst*, xvi, 7, p. 68, 1936.

Attention is drawn to what is evidently a further case of the new bacterial disease of pink begonias already reported from Germany [see preceding abstract]. The disorder was apparently favoured by a high soil moisture content, and the condition of the plants was improved by transference to more permeable soil.

RICHTER (H.). **Die Gelbsucht der Sommerastern.** [Yellows of China Asters.]—*NachrBl. dtsch. PflSchDienst*, xvi, 7, pp. 66–67, 3 figs., 1936.

China aster (*Callistephus chinensis*) yellows [*R.A.M.*, xv, p. 156], previously known only from North America and Japan, has reached Europe, where it was first detected in Hungary [as reported by Dobroscky in a personal interview with H. H. P. Severin: *Hilgardia*, xiii, p. 339, 1934] and subsequently (1935) in Berlin. An account is given of the symptoms and mode of transmission of the disease, based mainly on the work of Severin and Kunkel in the United States.

GAUDINEAU (Mlle M.). **Le wilt ou flétrissement des Reines-Marguerites.** [Wilt or withering of China Asters.]—*Ann. Épiphyt.*, N.S., ii, 2, pp. 145–157, 1 fig., 1936.

Full details are given of the author's studies on the wilt of China aster [*Callistephus chinensis*] in France caused by *Fusarium conglutinans* var. *callistephi*, an account of which has already been noticed from another source [*R.A.M.*, xv, p. 583].

ASUYAMA (H.). **The life-cycle of heteroecious species of Puccinia. II. Puccinia kusanoi Diet.**—*Ann. phytopath. Soc. Japan*, vi, 1, pp. 27–29, 1936. [Japanese, with English summary.]

Inoculation experiments with *Puccinia kusanoi* Diet. from *Pleioblastus* (*Arundinaria*) *simoni* Nakai and *P. chino* (Franch. & Sav.) Makino [*A. chino* Makino] showed that *Deutzia scabra* Thunb. var. *crenata* Makino is one of the alternate hosts of the rust, the aecidial stage of which is identified with *Aecidium deutziae* Diet.

WHITE (R. P.). **Summary of nine years' experience with Rhododendron wilt.**—*Plant Dis. Reptr*, xx, 13, pp. 204–207, 1936. [Mimeographed.]

The most important disease of *Rhododendron ponticum* seedlings (communicable by inoculation to *R. carolineanum*, *R. maximum*, *R. catawbiense*, *R. californicum*, and *R. caucasicum* var. Boule de Neige) in New Jersey is the *Phytophthora* wilt due to *P. cambivora* [*R.A.M.*, xii, p. 696; xv, p. 655]. Infection originates in one or more plants in a nursery and rapidly extends over an increasingly wide area. In inoculation experiments the first signs of wilting appeared in plants growing in soil with a relatively high moisture content, but eventually all were killed at a range of 30 to 90 per cent. of the water-holding

capacity. Conclusive evidence was obtained that the soil temperatures normally reached during the winter at a 4 in. depth at New Brunswick, N.J., are lethal to the fungus, the survival of which from one season to the next is therefore improbable. The maximum loss from the wilt is commonly sustained two to three weeks after transplanting, indicating an increased tendency to infection following injury or disturbance of the root system. Control measures, based on improved cultural practices, are concisely indicated.

Dodge (B. O.). **A stem-rot of Euphorbia lactea.**—*J.N.Y. bot. Gdn*, xxxvii, 439, pp. 165–168, 2 figs., 1936.

A brief description is given of a rather soft stem rot of *Euphorbia lactea* (particularly of the *cristata* variety) in the New York Botanic Garden, isolations from which yielded an unidentified species of *Coniothyrium* which was shown by inoculation to cause the rot and also to attack small *Stapelia gigantea* plants; the fungus is being further studied. During the winter of 1935–6 some trouble was also caused by common grey mould (*Botrytis*) [*cinerea*] on *E. pulcherrima*, presumably owing to faulty aeration or to too low temperature in the greenhouse.

Aggéry (Mlle B.). **Quelques maladies nouvelles des Fougères.** [Some new Fern diseases.]—*Bull. Soc. Hist. nat. Toulouse*, lxvii, 4, pp. 5–201, 9 pl. (7 col.), 206 figs., 1935. [Received June, 1936.]

In this exhaustive account of four new fungal and two new bacterial diseases of ferns in the eastern Pyrenees a partial wilt of the small leaves of *Polypodium vulgare*, its var. *serratum*, and *P. cambricum* is attributed to a new species of *Sphaerella*, *S. subostiolica*. The upper surfaces of the leaves of *P. vulgare* and its var. *serratum* showed a spotting due to *Homostegia polypodii* n. sp. A leaf spot of *Scolopendrium officinarum* was caused by *Gloeosporium nicolai* [*R.A.M.*, xii, p. 373], and of the above-mentioned species of *Polypodium*, as well as of *Aspidium aculeatum*, by *G. polypodii* n. sp. A brown spot of *P. vulgare*, its var. *serratum*, and *P. cambricum* was caused by combined bacterial and eelworm infection, the former apparently being the more pathogenic. A yellow leaf spot of the same species of *Polypodium* was due to the action of bacteria followed by saprophytic infection by a new species of *Sphaerulina*, *S. polypodii*. All the new species of fungi are provided with Latin diagnoses.

Although the ferns under observation are of wild origin, they are stated to be largely cultivated in gardens and greenhouses in the Toulouse district, and for this reason control measures against the foregoing diseases are briefly indicated. Mention should be made of the excellent coloured plates illustrating this monograph, which is followed by a five-page bibliography.

Noble (R. J.). **Ergot in Paspalum.**—*Agric. Gaz. N.S.W.*, xlvii, 7, pp. 403–405, 410, 4 figs., 1936.

A short, popular account is given of paspalum (*Paspalum dilatatum*) ergot (*Claviceps paspali*) in New South Wales [*R.A.M.*, xv, p. 724], the chief points dealt with being the geographical distribution of the disease (United States, Argentine, South Africa, and New Zealand),

symptoms, life-history, and the effect of climatic conditions on infection. The ergots were most conspicuous in the late summer, as small globular structures on the seed-head spikelets; they ranged up to about $\frac{1}{8}$ in. in diameter, and were hard, horny, grey, and slightly roughened on the surface.

MAINS (E. B.). **Host specialization of Uromyces trifolii.**—*Pap. Mich. Acad. Sci.*, xxi, pp. 129–134, 1936.

In this paper the author describes the results of studies of the host specialization of *Uromyces trifolii* [*R.A.M.*, xiv, p. 794] started in 1923 at Purdue (Indiana) University Agricultural Experiment Station, and continued since 1930 at Michigan University. Cultures from different collections of clover rusts were maintained on susceptible plants of the species from which they were collected, inoculations being made in greenhouses from November to May.

The results obtained showed that most of the *Trifolium armenium*, *T. incarnatum*, and *T. pannonicum* plants inoculated with the rust from *T. pratense* were more or less resistant, though a few were moderately susceptible. The majority of the inoculated plants of *T. pratense*, grown from each of eight different lots of seed were, however, susceptible [ibid., viii, p. 176], a small proportion showing little or no infection. Two hundred and seven of the most resistant plants were then self-pollinated, and from the small amount of seed obtained (*T. pratense* being mostly self-sterile) both very susceptible and very resistant plants were produced, indicating that resistance is probably a dominant character.

The results of inoculations with the rust from *T. hybridum* showed only the natural host to be uniformly susceptible; one strain of *T. angustifolium* was very susceptible and another very resistant to the rust collected from Ann Arbor, Michigan; one strain of *T. armenium* and one of *T. subterraneum* were moderately susceptible, other strains of the same two species being resistant to collections of the rust from Indiana.

Three strains of *T. repens* showed little or no infection when inoculated with the rust taken from this species, five strains showed a few uredosori on some of the plants, while in six strains a majority of the plants were very susceptible, a small proportion showing resistance. Most plants of *T. incarnatum* were resistant to the rust from *T. repens*, but a few were moderately susceptible. One strain of *T. resupinatum* was very susceptible, and two were very resistant. Two strains of *T. parviflorum* were moderately and two of *T. glomeratum* very susceptible.

There is evidently a considerable variation in reaction to the rust within a number of the species of *Trifolium*. The author considers that it would not be surprising to find differences in pathogenicity within the rusts occurring on red, alsike, and white clovers.

BROADFOOT (W. C.). **Experiments on the chemical control of snow-mould of turf in Alberta.**—*Sci. Agric.*, xvi, 11, pp. 615–618, 1936. [French summary.]

Golf courses, bowling greens, and lawns in Alberta are stated to have

suffered severely of recent years from snow mould, which was shown to be constantly associated with a *Fusarium* sp., a *Rhizoctonia* sp. [cf. *R.A.M.*, xv, pp. 445, 706], and frequently with an unidentified Basidiomycete with characteristic clamp-connexions. In pathogenicity tests at 6° C. each of these organisms was proved to be capable of attacking Chewing's fescue (*Festuca rubra* var. *fallax*), from which it is concluded that all three, either alone or in combination with one another, may cause turf trouble in Alberta. In pure culture the three fungi grew fairly well at temperatures between 0° and 6°; for the *Fusarium* and *Rhizoctonia* species the optimum was between 20° and 25°, and for the Basidiomycete from 6° to 15°; the last-named ceased growth at 20°.

The results of experiments showed that the trouble may be effectively controlled by applications of from 4 to 8 oz. of mercuric chloride or calomel [mercurous chloride] in sharp, dry sand per 1,000 sq. ft. of turf, the higher doses not causing noticeable injury to the grass when the turf was lightly watered after application. Under the conditions in Alberta an autumn dressing of equal parts of mercuric chloride and the slower oxidizing calomel at the combined rate of 4 oz. per 1,000 sq. ft. is recommended.

Weber (Anna). **Aeblesygdomme under Opbevaringen.** [Apple diseases in storage.]—Pamphlet issued by Faellesudvalget for Frugtavls-økonomie [Joint Committee for Fruitgrowing Economy], Copenhagen, 40 pp., 40 figs., 1936.

A useful, semi-popular account is given of the symptoms, etiology, economic importance, and control of some well-known physiological and fungal diseases [reference to which has frequently been made in this *Review*] affecting stored apples in Denmark.

Harding (P. L.). **Distribution of total soluble solids and catalase in different parts of Jonathan Apples.**—*J. agric. Res.*, liii, 1, pp. 43–48, 2 figs., 1936.

Experiments in 1935 at the cold storage laboratory of the Arlington Experiment Farm, Virginia, indicated that in Jonathan apples affected with soft scald [*R.A.M.*, xiv, p. 770 and next abstract] soluble solids were consistently less than in normal apples; in both cases, however, the concentration of the solids was greatest in the skin and gradually decreased towards the pith. Catalase activity, on the other hand, was highest in the skin and lowest in the tissue immediately under the skin in normal apples, while in soft-scalded apples it was highest in the pith region and lowest in the diseased area comprising the skin and the brown tissue immediately below the latter. These results suggest that preliminary work to detect localized differences should precede chemical and physiological studies, in which apples are usually analysed as a whole.

Miller (E. V.). **Distribution of acetaldehyde and alcohol in the Apple fruit.**—*J. agric. Res.*, lii, 1, pp. 49–55, 1936.

In this progress report the author states that the acetaldehyde and alcohol contents of the peel were shown to be higher in soft-scalded

Jonathan apples [see preceding abstract] than in normal fruit. The acetaldehyde content of the peel was also higher than normal in Grimes Golden apples affected with soggy breakdown. While the high acetaldehyde content of apple peel may in part be due to its production by cells ruptured in the paring process, there is also a tendency for the acetaldehyde to accumulate in peel either mechanically injured or impaired by abnormal physiological conditions of the fruit.

BROADFOOT (H.) & WHITTAKER (E. C.). **Superficial scald in Granny Smith Apples.**—*Agric. Gaz. N.S.W.*, xlvii, 7, pp. 393–395, 398, 2 figs., 1936.

Investigations [which are described, and the results of which are tabulated] carried out during a period of five years in New South Wales into possible means of prevention of superficial scald in Granny Smith apples kept for long periods in cold storage [*R.A.M.*, xiv, p. 769; xv, p. 482] showed that the use of oiled wraps or, instead, of thick layers of oiled strips between the tiers of fruit, greatly reduced scald, the oiled wraps giving better control and being easier to handle than the strips. Delayed storage without the use of oiled wraps gave some control, but the use of oiled wraps without delayed storage gave better results than delayed storage alone. By far the best results were given by the delayed storage of fruit in oiled wrappers.

The recommendations made (based on the experimental data obtained and other information) include holding the fruit in common storage in a well-ventilated shed for four to six weeks in cold, and two to three weeks in hot climates, and enclosing the apples in paper wrappers containing not less than 14 per cent. oil before placing them in the cold chamber.

SUTHERLAND (R.). **Prevention of storage wastage in Cox's Orange Pippin Apples.**—*N.Z. J. Agric.*, liii, 1, pp. 12–19, 6 graphs, 1936.

From 1932 to 1935 investigations into the causes of storage wastage in Cox's Orange Pippin apples were carried out by the New Zealand Department of Agriculture in co-operation with the Department of Scientific and Industrial Research and the New Zealand Fruit-export Control Board, the fruit being wrapped, packed, and forwarded to cold storage at Wellington through the usual channels as for export, and the examinations being made at times coinciding with the arrival of consignments at an overseas destination and subsequent marketing.

The results obtained showed that apples from light, sandy loams are less susceptible to bitter pit [*R.A.M.*, xv, p. 446] and internal breakdown [ibid., xv, p. 301] than comparable apples from clay soils (heavy loams). Bitter pit incidence varies from season to season with orchard conditions, is more serious in large than in small apples and on young than old trees (especially if the crop is light, and heavy rainfall occurs late in the growing season); susceptibility is greatest in apples picked when immature and becomes progressively less with maturity at picking. On the other hand, the more advanced the maturity at picking the greater the liability of the fruit to internal breakdown and fungal rotting. Internal breakdown was appreciably reduced by

storage at 37° F. instead of 32°. The paper concludes with notes on packing methods in relation to bruising.

Dufrénoy (J.). **Études épidémiologiques relatives à la tavelure du Pommier.** [Epidemiological studies relative to Apple scab.]—Reprinted from *Rev. Microbiol. appl., 1936*, 2, 20 pp., 3 figs., 2 graphs, 1936.

After referring to the need for the application of statistical methods to the study of the epidemiology of apple scab (*Venturia inaequalis*) in France, the author discusses the conditions requisite for attack and the resistance of apple varieties, and strongly emphasizes the importance of prompt and timely spraying with Bordeaux mixture or wettable sulphur as a preventive measure, warnings for which should be issued by wireless.

Gante (T.). **Nachblütenspritzungen zur Schorfbekämpfung beim Kernobst.** [Post-blossom sprays for scab control in pome fruits.]—*Obst- u. Gemüseb.*, lxxxii, 7, pp. 110–111, 1936.

In districts with a heavy summer rainfall the post-blossom treatment of apple trees against scab [*Venturia inaequalis*] with copper-containing mixtures is liable to induce scorching [*R.A.M.*, xv, p. 36]. Under the relatively dry conditions prevailing at Geisenheim-am-Rhein, twelve varieties treated with 0·75 per cent. nosprasit [ibid., xiv, pp. 79, 701] when the apples were the size of a hazel-nut sustained no injury to the fruit, though White Transparent and Charlamowski showed slight foliar scorching. On the other hand, the use of 0·75 per cent. copper oxychloride preparations resulted in severe fruit injury on Beauty of Boskoop, moderate damage on Minister von Hammerstein, and slight russeting on six other varieties, including Yellow Bellflower and Canada Pippin. The susceptibility to copper injury manifested by apples at the hazel-nut to walnut-sized stage gradually decreases, and for the late July and August applications copper sprays may safely be used at weak concentrations. For the control of pear scab [*V. pirina*] post-blossom applications of copper oxychloride [ibid., xv, p. 234] are recommended in preference to Bordeaux mixture, which is apt to cause damage to the fruit.

Hockey (J. F.). **Studies in fruit diseases. IX. Apple scab.**—*Circ. Dep. Agric. Can.* 109, 8 pp., 4 figs., 1936.

This is a popular note on apple scab (*Venturia inaequalis*) and its control in Canada, with special reference to Nova Scotia. The first ascospore discharge usually occurs in Nova Scotia when the buds are in the 'green tip' or 'mouse-ear' stage, and the process reaches a climax at the time of full bloom or petal-fall. In addition to lime-sulphur and Bordeaux mixture, a combination of iron sulphate and lime-sulphur is extensively used in the Maritime Provinces [*R.A.M.*, xv, p. 159] and may safely be applied to wet foliage.

Goodwin (W.), Pizer (N. H.), Salmon (E. S.), & Ware (W. M.). **The control of Apple scab: Allington Pippin and Newton Wonder, 1935.**—*J.S.-E. agric. Coll., Wye*, xxxviii, pp. 31–37, 1936.

In further comparative spraying tests against apple scab [*Venturia*

inaequalis: *R.A.M.*, xiv, p. 769] conducted in Kent in 1935, Newton Wonder trees given two pre- and two post-blossom applications of home-made Bordeaux mixture (8:12:100) and cotton-seed oil Bordeaux emulsion (as used in previous tests) [ibid., xiii, p. 779] gave, respectively, 38·8 and 34·2 per cent. scabbed apples, as against 92·7, 93·8, and 91·8 per cent. scabbed fruits in the unsprayed control plots. No results were calculated for similarly sprayed Allington Wonder trees as on these the crop failed. Clear evidence was again obtained that cotton-seed oil Bordeaux emulsion is as effective against *V. inaequalis* as hydrated-lime Bordeaux mixture, and it is recommended for commercial use on varieties tolerating Bordeaux mixture. In three seasons it caused no appreciable russeting. Further, while slight leaf-fall following frost occurred on trees of both varieties sprayed with Bordeaux mixture none was noted on the trees sprayed with the emulsion.

Link (G. K. K.) & Wilcox (H. W.). **Relation of nitrogen-carbohydrate nutrition of Stayman Apple-trees to susceptibility to fire blight.**—*Phytopathology*, xxvi, 7, pp. 643–655, 1936.

This is an amplified account of studies, already reported in outline by the first-named writer [*R.A.M.*, xiv, p. 370], on the relation of succulence and woodiness in Stayman apple trees, the former condition induced by an excess, and the latter by a deficiency, of nitrate nutrient solutions, to fireblight (*Erwinia amylovora*) [*Bacillus amylovorus*] infection [see next abstract].

Hildebrand (E. M.). **Overwintering of Erwinia amylovora in association with severe winter injury on Baldwin Apple trees.**—*Phytopathology*, xxvi, 7, pp. 702–707, 1 fig., 1936.

Evidence is presented to show that *Erwinia amylovora* [*Bacillus amylovorus*: *R.A.M.*, xv, p. 662] is capable of surviving in winter-injured Baldwin apple tissues in New York, having been recovered from 85 (24·6 per cent.) of the 345 stem cankers examined in March, 1934, following an excessively cold winter. A reinspection of 116 cankers in the next autumn showed that 55 (47·4 per cent.) had progressed for distances of 1 to 5 in. during the season, while some were still alive and exuding their characteristic milky fluid in the summer of 1935.

Wenzl (H.). **Eine neue Blattfleckenkrankheit des Apfels (Phyllosticta angulata n. sp.).** [A new leaf spot disease of the Apple (*Phyllosticta angulata* n. sp.).]—*Phytopath. Z.*, ix, 3, pp. 349–356, 2 figs., 1936.

Nursery apple trees in two of the more humid regions of Lower Austria were observed in 1935 to be affected by a leaf spot due to a species of *Phyllosticta* with pycnidia (on the upper surface only) 80 to 130 μ in diameter, with a circular ostiole, 13 to 17 μ in diameter, and unicellular, hyaline, elliptical spores averaging 5·5 to 6·5 by 2·7 to 3·4 μ, to which the name of *P. angulata* n. sp. is given [with a diagnosis in German only] on account of the angular shape of the lesions. These are 0·5 to 1 mm. in breadth, often confluent, visible on both leaf surfaces,

mostly without a sharply defined margin, yellowish-brown at maturity, and bounded by the fine veins; the aspect of the affected foliage is peculiarly mosaic-like.

Cheo (C. C.). **Tan spot rot of Peili (Pyrus bretschneideri Rehd.).**—*Bull. Chin. bot. Soc.*, ii, 1, pp. 1–15, 3 figs., 1936. [Chinese summary.]

Pear scab (*Fusicladium pirinum*) [*Venturia pirina*] is stated to be widely distributed in northern China, where a more serious disease of white pears (*Pyrus bretschneideri*) known as tan spot rot, is due, however, to *Corticium centrifugum* [*R.A.M.*, xv, p. 395]. The circular, tan spots on the fruits coalesce under damp conditions to large, dark brown, rotten areas, often covering over half the surface and liable to secondary invasion by a greenish-black *Alternaria*. The internal affected portion is conical and usually extends to a depth about equal to the diameter of the superficial lesions (up to 1·5 cm.). The diseased tissues turn brown and assume a dry, spongy consistency, while a cavity usually underlies the infected area. A peculiar sweet odour is sometimes emitted by the spotted pears. On the market tan spot rot is most prevalent during December and January.

Two strains, each regarded by the author as belonging to *C. centrifugum*, were isolated from *P. bretschneideri*, to which both are equally pathogenic. One of these, originally forming basidiospores in abundance on potato glucose agar, becomes sterile after several transfers in the laboratory; it produces a characteristic odour either on the host or on culture media. The second strain is sterile, but forms numerous sclerotia in culture and is non-odorous. The optimum temperatures for the development of strains 1 and 2 are 26° to 27° and 17° to 18° C., respectively. Both strains can infect *P. serotina*, a number of undetermined *P.* spp., and Hwailai apples, producing fish-eye spot [ibid., xiv, p. 701] through punctures on the last-named host. A strain of *C. centrifugum* from the Peihaitang variety of *Malus* [*P.*] *spectabilis* was found to be culturally and morphologically identical with strain 2 from *P. bretschneideri*, and each strain was cross-inoculable to the other host. The somewhat aberrant strains of the fungus (which are nevertheless thought to be merely physiologic forms of the same species) from two *P.* spp. and vine cuttings also cause typical tan spot symptoms on white pears.

Hatton (R. G.). **Plum rootstock studies: their effect on the vigour and cropping of the scion variety.**—*J. Pomol.*, xiv, 2, pp. 97–136, 4 pl., 1936.

Observations made at East Malling on the incidence of silver leaf disease (*Stereum purpureum*) [*R.A.M.*, xv, p. 729] in a trial plot of ten plum varieties showed that the most resistant varieties were Red Cherry Plum (Myrobolan), Prune Damson, Denniston's Gage, and Black Bullace with only 6, 22, 38, and 48 per cent. trees infected, respectively, as against 84, 80, 73, 73, 69, and 66 per cent. infected for Victoria, Belle de Louvain, Czar, Yellow Egg, Purple Egg, and Giant Prune. The final recoveries from infection amounted to 100 per cent. for Red Cherry Plum and Prune Damson, 96 per cent. for Yellow Egg,

and only 39 per cent. for Victoria, the others being intermediate in this respect. Whereas only 64, 66, and 67 per cent. of the varieties worked on Common Mussel, St. Julian (Seedlings), and Myrobolan (Seedlings) rootstocks, respectively, recovered, 77 per cent. of the trees on Yellow Egg (Pershore) and 87 per cent. of those on Common Plum returned to normal [ibid., xiv, p. 772].

In a further plot a sudden outbreak of bacterial die-back (*Pseudomonas mors-prunorum*) [ibid., xv, p. 729] occurred two years after planting, killing 40 Victoria trees in 1924, 8 in 1925, 10 in 1926, and 1 in each of the years 1927, 1932, and 1934. Rivers's Early Prolific remained unaffected, and two President trees were killed. These infections appeared to bear no relation to the rootstock. A planting of the Czar variety also suffered severely from bacterial die-back in the third, fourth, and fifth years after planting, there being no clear indication that rootstock influence affected resistance in any way; none of the trees of the Utility or Purple Egg varieties in the same plot were attacked.

Nicolas (G.) & Aggéry (Mlle B.). **Une maladie grave des jeunes Pêchers des environs de Toulouse.** [A serious disease of young Peaches in the vicinity of Toulouse.]—*Bull. Soc. Hist. nat. Toulouse*, lxvii, 2, pp. 228–236, 7 figs., 1935. [Received June, 1936.]

A Latin diagnosis is given of *Dothiopsis rufa* n. sp., the agent of a severe die-back of young peach branches in a humid situation near Toulouse, the Précoce de Halle variety being chiefly affected and the Fleur de Mai and Amsden resistant. The fungus is characterized by numerous subglobose, black, unilocular stromata, 800 to 1,500 μ in diameter, 700 to 980 μ in height, with an ostiole, 160 μ in diameter, and by slightly curved, hyaline, continuous conidia, 5 to 8 by 1 to 5 μ, exuded in vermiform, reddish cirri from the hyaline, elongated conidiophores, 18 to 26 μ in length. The species is placed in *Dothiopsis* since the writers consider that this genus should comprise all unilocular and uniostiolar species, *Cytospora* being retained for those furnished with stromata consisting of several pycnidia and pores.

Control measures should be based on improved cultural practices and the application to the wounds through which the fungus enters of 2 to 3 per cent. Bordeaux mixture or potassium permanganate (350 gm. per hectol.), followed by painting with tar.

Bodine (E. W.). **Peach mosaic disease in Colorado.**—*Bull. Colo. agric. Exp. Sta.* 421, 11 pp., 9 figs., 1 diag., 1936.

A popular account is given of peach mosaic in Colorado [*R.A.M.*, xv, p. 559], where the widely grown Elberta and J. H. Hale varieties show the most pronounced symptoms, which are equally conspicuous on Stanwick and Red Roman nectarines. The writer insists on the importance of eradication even of only partially diseased trees, the detection of which necessitates frequent orchard inspections, e.g., as soon as the leaves have unfolded, a week or ten days later, at mid-season, and shortly before harvest.

HARRIS (R. V.). **Growing healthy Raspberries. The control of diseases and pests.**—*Rep. E. Malling Res. Sta., 1935*, pp. 232–242, 1936.

Notes are given on the symptoms and control of the chief diseases and pests attacking the Lloyd George raspberry variety in England, including blue stripe wilt (*Verticillium dahliae*) [*R.A.M.*, viii, p. 183; xii, p. 705], cane spot (*Elsinoe veneta*) [ibid., xiv., p. 219], spur blight (*Didymella applanata*) [ibid., xiv, pp. 595, 775], mosaic [ibid., xv, p. 377], and leaf scorch [ibid., xiii, pp. 40, 111, 173]. The paper concludes with a discussion of varietal susceptibility to raspberry diseases.

ZELLER (S. M.). **A new disease of Youngberry in Oregon.**—*Plant Dis. Reptr*, xx, 13, p. 209, 1936. [Mimeographed.]

Stigma and anther blight of youngberry (a hybrid dewberry), caused by *Haplosphaeria deformans* [*R.A.M.*, xiv, p. 495], has been observed in Oregon, this being apparently the first record of the fungus in the United States. 'Dry berry' of loganberries, due to the same organism, was also very prevalent in parts of Oregon in the early summer of 1936.

MARCEL (M.). **Étude sur la dégénérescence des Fraisiers (ses causes, comment y remédier).** [A study on Strawberry degeneration (its causes and how to control it).]—*Bull. Soc. nat. Hort. Fr.*, Sér. 6, iii, pp. 211–214, 1936.

Strawberry degeneration in France assumes various forms—rolling, crinkling, stunting, yellow edge [*R.A.M.*, xv, p. 732] and mosaic of the foliage, immature and hard fruits in the popular Parisian Madame Moutot variety; weak, straggling plants in the Vicomtesse Héricart de Thury (dating from 1849); and in certain centres of production a root rot characterized by blackening and desiccation of the cortex, a reddish discoloration of the interior, and an elongation of the tap-root, which is destitute of rootlets. Control by means of mass selection is suggested and discussed.

BERGMAN (H. F.) & WILCOX (MARGUERITE S.). **The distribution, cause, and relative importance of Cranberry fruit rots in Massachusetts in 1932 and 1933, and their control by spraying.**—*Phytopathology*, xxvi, 7, pp. 656–664, 2 graphs, 1936.

Early rots, chiefly due to *Glomerella* [*cingulata* var. *vaccinii*], *Sporonema* [*oxycocci*], and *Diaporthe* [*vaccinii*: *R.A.M.*, xi, p. 188], caused most of the spoilage of Early Black, Howes, Middleboro, and Holliston cranberries from unsprayed plots in the majority of the Massachusetts bogs inspected during the seasons of 1932 and 1933 [cf. ibid., xiv, p. 776]. *S. oxycocci* was found to be a much more important pathogen than would be suspected from previous reports, causing a loss of 30 to 38 per cent. of the berries from three untreated plots on one bog in 1933, while *D. vaccinii* was responsible for a reduction of 18 to 35 per cent. of the crop from several plots in the same year. *G. cingulata* var. *vaccinii* was the principal agent of spoilage in berries from unsprayed plots on certain sites in both years. *Godronia* [*cassandrae*: loc. cit.] and *Guignardia* [*vaccinii*: ibid., xi, p. 429] were much less injurious than the foregoing during the period under review; the

former apparently attacks the fruit during the latter part of the summer, since its incidence was very much lower in plots sprayed three times (the last application between 10th and 15th August) than in those receiving only two treatments. Apart from this, however, two applications of 4–6–50 Bordeaux mixture at the rate of 300 to 400 galls. per acre were frequently equally effective with three; potassium fish-oil soap was usually added at the rate of 1 lb. per 50 galls. water. Phenyl mercury acetate and ethyl mercury arsenate, used at the rate of 1 lb. in 100 galls. water, gave quite as good control as Bordeaux mixture on one bog in 1932. *S. oxycocci* proved more amenable to fungicidal treatment than either *Glomerella cingulata* var. *vaccinii* or *D. vaccinii*.

BITANCOURT (A. A.). **Sobre Chaetothyrium guaraniticum Speg. e Chaetothyrina musarum (Speg.) Theissen.** [On *Chaetothyrium guaraniticum* Speg. and *Chaetothyrina musarum* (Speg.) Theissen.] —*Arch. Inst. biol. Def. agric. anim., S. Paulo*, vii, 1, pp. 5–22, 2 pl., 2 figs., 1936. [English summary.]

Chaetothyrina musarum (Speg.) Theissen (syn. *Chaetothyrium musarum* Speg.) is the agent of a prevalent sooty blotch affecting 'prata' [silver] and 'figo' [fig] bananas [*R.A.M.*, xv, p. 487] and occasionally attacking the 'maça' [apple] variety in Southern Brazil, where the Dwarf Cavendish, the sort chiefly used for foreign export, is, however, apparently immune. An examination of the type specimens of *Chaetothyrina musarum* and *Chaetothyrium guaraniticum* Speg. showed the former to belong to the Hemisphaeriales, with typical scutiform perithecia, while the latter is a representative of the Perisporiales, with closed conceptacles. An amended Latin diagnosis of the genus *Chaetothyrina* is therefore given, the other species *C. phoebes*, *C. consociata*, and *C. amadelpha* Syd., and *C. megalospora* Pet. & Cif. being referred to *Microcallis*, where they were originally placed.

Formaldehyde for seed and soil treatment. A bibliography.—55 pp., Wilmington, Delaware, The R. & H. Chemicals Department, E. I. du Pont de Nemours & Company, Inc., 1936. [Mimeographed.]

This annotated bibliography of the use of formaldehyde for seed and soil treatment is divided into two sections, (1) dealing with the effect on seeds and (2) with the fungicides containing formaldehyde and the effect on the pathogen (listed mostly under the common name).

VINAS (J.). **La protection des cultures par traitement á sec. Les poudres insecticides et anticryptogamiques. Leurs propriétés et leur préparation.** [Protection of crops by dusting. Insecticidal and fungicidal dusts. Their proprieties and their preparation.]—*Rev. Vitic., Paris*, lxxxiv, 2187, pp. 349–357; 2188, pp. 365–370; 2189, pp. 387–390; 2190, pp. 397–406, 5 figs., 1936.

After a brief historical outline of the practice of dusting crops with insecticidal and fungicidal dusts since its introduction by Kyle in England in 1846, the author gives a broad description of the newest developments both from the theoretical and practical standpoints. The advantages and drawbacks of dusting over spraying, the necessary chemical and physical properties of the dusts, dosage, and methods of

application, as well as details of their preparation and of the construction of hand- and mechanically-driven dusting apparatus, are separately dealt with at some length. A comprehensive bibliography of the relevant literature is given in the form of foot-notes.

Desrue (A.). **Les alcools terpéniques sulfonés en agriculture.** [Sulphonated terpenic alcohols in agriculture.]—*Progr. agric. vitic.*, cv, 25, pp. 594–597, 1 fig., 1936.

In this paper the author states that sulphonated terpenic alcohols [*R.A.M.*, xv, p. 736] are eminently suitable for use as spreaders with sprays for the control of diseases caused by fungi either with intramatrical or with superficial mycelium, e.g., vine mildew [*Plasmopara viticola*] or *Oidium* [*Uncinula necator*].

Mitter (J. H.). **Some recent contributions to our knowledge of heterothallism in fungi.**—*J. Indian bot. Soc.*, xv, 3, pp. 183–192, 1936.

The history of contemporary research on heterothallism in different groups of fungi is concisely summarized and illustrated by references to some outstanding examples of the phenomenon, many of which have been mentioned from time to time in this *Review*.

Mitter (J. H.). **Fungous plant pathology and mycology in India.**—*Proc. twenty-second Indian Sci. Congr., 1935*, pp. 221–245, 1935. [Received 1936.]

In this address the author reviews in some detail the history of mycological work in India and urges closer co-operation between the Imperial Agricultural Research Institute, Delhi, and the Universities.

Alcorn (G. D.) & Worley (Claire L.). **A new staining technic for perithecia of the Erysiphaceae.**—*Stain Tech.*, xi, 3, pp. 119–120, 1936.

The following technique has been found satisfactory for staining perithecia of the Erysiphaceae. The organs should be placed, immediately on removal from the host, in Ziehl's carbol fuchsin for 48 hours or more in an oven at 50° C., transferred to a clean slide, covered, opened by smart tapping on the cover slip, heated for 15 minutes in an oven at 95°, with the repeated addition of water to replace that lost by steaming, destained by drawing 6 to 10 drops of acid alcohol rapidly under the cover glass by means of filter paper, washed in a series of 25, 50, and 75 per cent. xylene in 95 per cent. alcohol, followed by pure xylene, and mounted in balsam or hyrax.

Stevens (N. E.). **Environmental conditions and the wasting disease of Eel-Grass.**—*Science*, N.S., lxxxiv, 2169, pp. 87–89, 1 graph, 1936.

Finding the current explanations of the wasting disease of eelgrass (*Zostera marina*) [*R.A.M.*, xv, p. 671] unconvincing, the writer suggests that the cause of the phenomenon should be sought in other than purely local conditions. The three recorded periods of eelgrass scarcity coincide with the phases of extreme north declination of the moon, falling in 1894, 1912, and 1930, which it is thought may well be associated

with changes in obscure sea currents tending to weaken the plant or bring about fluctuations of temperature exceeding the narrow limits found by Setchell (*Science*, lvi, p. 575, 1922) to favour its growth. Another factor to be considered is that of extensive warm transgressions in the Atlantic Ocean, in which the continental waters of polar origin are invaded by tropical currents with marked effect on the abundance of fish. Three such transgressions coincided with the above-mentioned north declination phases of the moon, and though highly speculative it is not unreasonable to take into consideration the possibility that they contribute to the disappearance of the North Atlantic eelgrass at those times.

Blegvad (H.). **An epidemic disease of the Eel-Grass (Zostera marina L.).**—*Rep. Danish biol. Sta.*, xxxix (*1934*), pp. 3–8, 1 map, 1935. [Received 1936.]

In this general account of the dying-off of eelgrass (*Zostera marina*) [see preceding and next abstracts] in Denmark the author states that the decline mostly began during the autumn, winter, and spring of 1932–3, and it is noteworthy that the disease has followed the currents of the open waters, e.g., the main fairways of the Limfjord. Prof. E. Lönnberg, in a report from the Kristineberg (Sweden) Zoological Station (summer, 1933), attributes the spread of the condition from America to southern and thence to northern Europe to the vigorous pressure of 'southern bank water', which carries with it organic life of many types not forming a normal part of the local fauna.

Petersen (H. E.). **Preliminary report on the disease of the Eelgrass (Zostera marina L.).**—*Rep. Danish biol. Sta.*, xl (*1935*), pp. 3–8, 4 figs., 1935. [Received 1936.]

In studies on the wasting disease of *Zostera marina* [see preceding abstracts] at the Marine Biological Laboratory of Copenhagen University the writer found *Labyrinthula* [*R.A.M.*, xv, p. 671] in Danish material. The strikingly infectious character of the disease is believed to be due, however, to *Ophiobolus* [*halimus*: ibid., xiv, p. 599], formed principally in the rhizomes, the ascospores of which adhere readily to the outer leaves of the shoot. The greyish, later rusty-red *Ophiobolus* mycelium makes good growth on a decoction of sterilized *Zostera* material, boiled in salt water and mixed with agar. Some evidence of physiological specialization within the fungus is available.

Murphy (P. A.). **Some effects of drought on Potato tubers.**—*Emp. J. exp. Agric.*, iv, 15, pp. 230–246, 2 pl., 5 graphs, 1936.

As a result of studies carried out at Glasnevin, Ireland, from 1933 to 1935 the author distinguishes ten types of drought effect on the potato. Of these, cracking [cf. *R.A.M.*, xv, p. 525], often associated with hollow heart [ibid., xi, p. 535], is due to resumed growth following a check caused by drought. Absence of boron aggravates the condition, as do certain forms of virus diseases. Cracking may also occur during or after harvesting, and may then be caused by over-turgidity, as when frost kills the foliage but allows root action to continue.

Hollow heart affects large tubers mostly; the optimum soil temperature for the condition is approximately 18° C. Attacks are often associated with spindle tuber [ibid., xv, p. 460].

Visible stem-end wilt, best known in the United States, was only observed four times, in the President, Arran Pilot, and British Queen varieties. It is attributed to drought and excessive transpiration.

Glassy end [ibid., x, p. 335] is uncommon in Ireland, where it has been found only in Arran Cairn and Arran Pilot, which are particularly susceptible, as is Golden Wonder in Scotland, and Burbank in the United States. In Ireland it follows drought, and is associated with second growth, stem-end wilt, and premature sprouting; it is usually followed by a jelly-end rot. The stem end shows a progressive soft rot, in advance of which the flesh is yellow, glassy, and devoid of starch. The rot eats away much of the original tuber, and then stops, the diseased part being sloughed off.

Necrosis of the vascular ring and surrounding parenchyma due to drought and heat occurs under very hot conditions, the symptoms being most conspicuous in the outer phloem and cortex, especially at the rose and heel ends. In another form of the disease, groups of yellow or brown dead cells, varying from specks to areas half an inch in diameter, develop in any part of the flesh, sometimes in storage.

Bechhold (H.) & Erbe (F.). **Versuche zur Aufklärung des Mechanismus der 'Kupferprobe' zur Feststellung des Kartoffelabbaus.** [Attempts at the explanation of the mechanism of the 'copper test' for the determination of Potato degeneration.]—*Phytopath. Z.*, ix, 3, pp. 259–296, 4 diags., 1936.

It was ascertained by means of the copper strip test [*R.A.M.*, xv, p. 171] that no appreciable differences exist between sound and 'degenerate' potato tubers [see next abstracts] in respect of tyrosinase and melanin formation [ibid., xv, p. 526], whereas with regard to the oxidation-reduction system, the components favouring oxidation take precedence in healthy tubers and those stimulating reduction in diseased material. The action of the oxidation-reduction system on the copper strip is conceived as falling into two parts: in the first place, it causes the oxidation and dissolution of the copper, and secondly it induces, under the action of high temperatures (the experimental tubers were incubated at 37° C. for 8 hours and at 18° to 20° for 16 hours), damage to the membranes separating the cells mechanically injured by the insertion of the copper strip from the intact tissues. The metabolic disturbances arising from this secondary injury may ultimately involve large portions of the healthy tuber, whereas in the case of 'degenerate' material the oxidizing capacity of the tissues is inadequate to produce such far-reaching modifications. The sterilization of the test tubers and of the copper strip failed to alter the process in any particular, showing that micro-organisms play no part in the development of the characteristic tissue changes. The substitution of inert substances, e.g., wood, glass, or quartz for copper strips cannot be recommended, since the resultant tissue alterations, while generally resembling those described above, are not always sufficiently clear-cut to permit of the accurate diagnosis of health or disease. Rapid freezing

also leads to cellular injury and consequent blackening extending throughout the tuber.

WARTENBERG (H.) & LINDAU (G.). **Studien über die 'Dehydrase-wirkungen' gesunder und abbaukranker Kartoffelknollen.** [Studies on the 'dehydrase reactions' of healthy and degenerate Potato tubers.]—*Phytopath. Z.*, ix, 3, pp. 297–324, 1936.

The expressed juices of 'degenerate' potato tubers were experimentally ascertained to undergo more rapid clarification in contact with a methylene blue solution (as indicated by the decoloration of the stain) than those of healthy material. The diagnostic use of this differential character is complicated by the failure of attempts to establish an objective standard of values for comparative purposes, but it appears certain from theoretical considerations that a parallel exists between the differences in the oxidation-reduction potentials of tissue emulsions of diseased and healthy tubers [see next abstract] and variations in their dehydrase reactions [*R.A.M.*, xiv, p. 650].

WARTENBERG (H.), HEY (A.), & TAHSIN (A.). **Untersuchungen über die Azidität des Gewebebreies der Kartoffelknolle. Die elektrometrische Pflanzgutwertbestimmung der Kartoffelknolle. II. Mitteilung.** [Studies on the acidity of the tissue emulsion of the Potato tuber. The electrometric determination of the seed value of the Potato tuber. Note II.]—*Arb. biol. Reichsanst. Land- u. Forstw., Berl.-Dahl.*, xxi, 4, pp. 499–516, 1 graph, 1936.

Measured by the hydrogen electrode (found to be preferable for the authors' purposes to the glass electrode), the tissue emulsions of 'degenerate' potato tubers [see preceding abstracts] showed a tendency to alkalinity, indicating the predominance of a carbonate-bicarbonate system which is less prevalent in healthy material. The actual reaction values of the tissue emulsions of 'degenerate' and sound tubers do not deviate appreciably from a mean hydrogen-ion concentration, so that differences in the seed value (oxidation-reduction) potentials are not substantially affected by acidity divergences.

BEAUCARNOT (R.). **Rendements comparatifs de l'Institut de Beauvais avec d'autres variétés résistantes à la galle verruqueuse.** [Comparative yields of the Institut de Beauvais with other varieties resistant to wart disease.]—*J. Agric. prat., Paris*, N.S., c, 10, pp. 200–203, 1936.

In experiments carried out in France on the effect of degeneration diseases [*R.A.M.*, xv, p. 597] on the yield of potato varieties resistant to wart [*Synchytrium endobioticum*: ibid., xv, p. 601], Max Delbrück contracted only 4 per cent. degeneration during the five years covered by the trials and gave a yield 197 per cent. that of Institut de Beauvais, the corresponding figures for Arran Banner, Kerr's Pink, Cellini, Ackersegen, Betula, Champion, and Sickingen being 175, 168, 155, 143, 136, 134, and 110 per cent., respectively. Cellini is becoming accustomed to light soils but Betula needs improvement from the standpoint of constitutional vigour, having developed 8 per cent. degeneration during the period of the observations. The Parnassia, Robinia, Arran

Pilot, and Belle de Fontenay varieties gave inferior yields and suffered severely from degeneration, so that their further cultivation, except on a small horticultural scale, is considered inadvisable.

NYHUS (P. O.). **The Potato situation in Argentina.**—*Amer. Potato J.*, xiii, 7, pp. 185–189, 1936.

Drought, insects, and diseases are stated to have decimated the 1936 Argentine potato crop, and the consequent sharp advance in prices has necessitated the purchase of foreign certified table and seed stocks from Germany, Scotland, the United States, and Canada. In Balcarce the heavy aphid infestation resulted in an extensive spread of mosaic and other virus diseases [*R.A.M.*, xv, p. 248]. In the Rosario district the writer examined on 15th May field after field with 70 per cent. or more of mosaic and leaf curl, locally known as 'crispy potatoes'. In Uruguay a similar situation prevails, and here the unreliability of uncertified foreign seed has been convincingly demonstrated by the development of over 60 per cent. mosaic and leaf curl in the progeny of a high-yielding crop of southern United States seed. Generally speaking, northern-grown certified seed of approved varieties, carefully rogued and sprayed, appears to give satisfactory yields for two or three generations, but it is hoped to improve the Balcarce (Argentine) crops to such an extent that they will serve as an economical source of supply for Uruguay.

IWADARE (S.). **On the geographical distribution of the black rot of Rice-grains and the relation of atmospheric temperature to the outbreak of the disease.**—*Rep. Hokkaido agric. Exp. Sta.* 36, pp. 1–52, 1 fig., 1 graph, 1 map, 1936. [Japanese, with English summary on pp. 2–4.]

Pseudomonas itoana Tochinai, the agent of a severe black rot of rice which is prevalent in the northern districts of Hokkaido and more sparsely distributed in other parts of Japan [*R.A.M.*, xi, p. 535], has been shown by six years' statistical studies (1929 to 1934) to be closely connected with atmospheric temperature relations. The disease occurs in seasons when the mean temperatures during July and August both exceed 20° C., while those above 22° favour epidemic outbreaks; under cooler conditions (below 20°) the incidence of infection is slight.

KILLIAN (C.). **Étude sur la biologie des sols des hauts plateaux algériens.** [A study on the soil biology of the Algerian high plateaux.] —*Ann. agron., Paris*, vi, 4, pp. 595–614, 1 fig., 4 graphs, 1936.

In cultivated soil in the high plateaux region of Algeria the author found *Mucor mucedo* and *M. spinosus* [*R.A.M.*, xv, p. 257] in the proportions of 60 and 40 per cent., respectively, while uncultivated soil in the same locality showed the presence of *M. mucedo*, *Rhizopus niger*, *Aspergillus niger*, *A. calyptratus*, *Gliocladium penicillioides*, *Sporotrichum polysporum*, and *S. luteo-album* to the extent of 6, 10, 40, 10, 10, 18, and 1 per cent., respectively. The fungal content of uncultivated soil was only 57,000 individuals per gm. in April, 1934, as compared with 156,000 for the cultivated.

Galloway (L. D.). **Indian soil fungi.**—*Indian J. agric. Sci.*, vi, 3, pp. 578–585, 1936.

The most striking feature of the 200 fungal isolations from Indian soils, representing some 30 genera, is the predominance of *Aspergillus* spp., the most frequent of which was *A. nidulans* [*R.A.M.*, xv, p. 314, and above, p. 804], followed by *A. niger*, *A. terreus*, and *A. ustus*. *A. fumigatus*, a very common occupant of most soils, occurred in only three samples; contrary to Thakur's and Norris's results [ibid., viii, p. 334], however, it played an active part in cellulose decomposition, as also did *A. ustus*, *A. terreus*, *A. ochraceus*, *Penicillium* spp., *Chaetomium* (?) *indicum*, *Trichoderma lignorum* [ibid., xv, pp. 257, 526] (found only in two samples), *Melanconium* sp., representatives of the *tenuis* group of *Alternaria*, *Acrothecium lunatum* [*Curvularia lunata*: ibid., xv, p. 740], *Helminthosporium sativum* and *H. tetramera* [ibid., xiv, p. 622], *Stysanus stemonites*, *Dematium* sp., *Trichosporium* (?) *fuscum* [ibid., xv, p. 257], and (?) *Epochnium* sp.

Newhall (A. G.) & Nixon (M. W.). **Disinfecting soils by electric pasteurization.**—*Bull. Cornell agric. Exp. Sta.* 636, 20 pp., 4 figs., 7 graphs, 1936.

After describing two portable electric soil sterilizers [cf. *R.A.M.*, xv, pp. 255, 314], in one of which the current passes directly through the soil (Ohio type), while in the other it passes through resistance units (New York type), the authors state that both types destroyed a number of common pathogens, namely, *Erwinia carotovora* [*Bacillus carotovorus*], *Sclerotinia sclerotiorum*, *Rhizoctonia*, *Fusarium* sp., *Phytophthora cactorum*, and *Pythium ultimum*, it being unnecessary in the presence of adequate soil moisture to raise the soil temperature above 70° C. All kinds of soils were effectively treated by both types of apparatus, electric pasteurization apparently giving as good results as the best standard methods of soil and seed treatment for damping-off (*Pythium* and *Rhizoctonia*). The current consumed per cu. ft. per degree increase varied with the type of soil from 22 or 23 watts (pure sand) to 27 or 28 watts (muck soil). In general, an increase from initial 20° to final 70° required from 1 to 1·3 kilowatt hours per cu. ft.

A certain minimum initial soil moisture was found to be essential for the most effective working of both types of pasteurizer, though for different reasons. In the New York type it is needed for thermal conductivity and to prevent drying, and hence excessive heating, close to the heating units; in the Ohio type it is required to ensure rapid rise in temperature, as the soil solution carries the current.

Salmon (E. S.) & Ware (W. M.). **The downy mildew of the Hop in 1935.**—*J.S.-E. agric. Coll., Wye*, xxxviii, pp. 48–52, 1936.

In this account of the hop downy mildew [*Pseudoperonospora humuli*: *R.A.M.*, xv, p. 462] situation in England in 1935, the authors state that the production of basal spikes was less than usual, probably owing to cold, dry weather in April and May, though some spikes black with spores were found. Warm, wet weather at the end of June induced the formation of terminal and lateral spikes in some gardens, but

owing to subsequent drought there was no attack on the cones even in unsprayed gardens, the crops being free from infection for the third successive season. There is a danger that some growers may be caught unprepared in the next wet season.

Salmon (E. S.) & Ware (W. M.). **The Cladosporium disease of Hops.**—*J.S.-E. agric. Coll., Wye*, xxxviii, pp. 53–54, 1 fig., 1936.

In 1935 three further cases of infection of hop cones (Tutsham and Fuggles varieties) by a *Cladosporium* [*R.A.M.*, xiii, p. 354; xv, p. 462] were observed by the authors. So far, the disease has been sporadic, and has not necessitated control measures being taken, but owing to its resemblance to downy mildew [*Pseudoperonospora humuli*] growers in some cases pick the crop before it is ripe. In certain seasons the petals show a general pale brown discoloration, or isolated, pale brown patches, due to heat from the sun following morning mists. This 'sun scald' and the *Cladosporium* disease may occur on petals of the same cone.

Van Fleet (W.). **Goldenseal under cultivation.**—*Fmrs' Bull. U.S. Dep. Agric.* 613 (revised), 13 pp., 6 figs., 1936.

Botrytis blight [*R.A.M.*, iv, p. 44] is stated to be the most destructive disease of golden-seal (*Hydrastis canadensis*), a perennial cultivated for its medicinal properties in Ohio, Indiana, West Virginia, Kentucky, and elsewhere in the United States. The fungus attacks all parts of the plant, the most conspicuous symptoms on which are leaf blight and basal rot of the petioles; 10 to 20 per cent. of the tops may be destroyed. Control measures should consist in the elimination of all diseased material, including mulching refuse in which the fungus may overwinter, spraying of the beds with copper sulphate (1 lb. in 10 galls. water) before replacing the mulch, and the application of Bordeaux mixture or some other standard fungicide—the last-named practice being, however, only partially effective.

Drechsler (C.). **Pythium graminicolum and P. arrhenomanes.**—*Phytopathology*, xxvi, 7, pp. 676–683, 3 figs., 1936.

The author does not concur in Carpenter's opinion (*Hawaii. Plant. Rec.*, xxxviii, p. 279, 1934) that *Pythium graminicolum* [*R.A.M.*, xv, p. 560] and *P. arrhenomanes* [ibid., xv, p. 432], both active agents of sugar-cane root rot in the southern United States, should be united as a single species. A close mycelial connexion between oogonium and antheridium, very frequent in *P. graminicolum* on maize meal agar, is rare in *P. arrhenomanes*, while in parallel cultures the sturdy, more substantial membranous portions of the sexual apparatus of the former species remain clearly discernible long after the evanescent antheridial envelopes and supporting branches of the latter have almost or entirely disappeared.

McClean (A. P. D.) & Halse (R. H.). **Streak disease of Sugar Cane. Its economic importance in South Africa.**—*S. Afr. Sug. J.*, xx, 7, pp. 431, 433, 435, 437, 439, 441, 443, 445, 447, 449–450, 1 diag., 1936.

The writers' studies on sugar-cane streak and its economic importance in South Africa have already been noticed from another source [*R.A.M.*, xv, p. 744].

ABBOTT (E. V.). **Conditions influencing germination of seed Cane and stands with disease resistant varieties.**—*Sug. Bull.*, xiv, 20, pp. 1–6, 1936.

Under Louisiana conditions rapid germination of immature seed cane can be obtained by planting early in August, thereby escaping the seed rots apt to develop in autumn planted stands. Varieties adapted to early August planting are Co. 281 and 290 and C.P. 807 and 28/19. Mosaic-free seed germinates better than diseased, especially in the case of Co. 281. Heavy losses may result from red rot [*Colletotrichum falcatum*: *R.A.M.*, xv, p. 605], especially among P.O.J. 213 and C.P. 807 stands, Co. 281 and 290 and C.P. 28/19 being more resistant to this fungus and giving an average germination percentage of 30 per cent. in the district under observation (compared with 10 to 20 per cent. for the noble varieties); the same figure is reached by an unreleased seedling, C.P. 29/116. In tests with November plantings in 1935 of the varieties, Co. 281 and 290 and C.P. 807, 28/19, and 29/320, only 22, 32, 28, 26, and 18 of 100 original sound eyes germinated, respectively, 13, 22, 17, 5, and 33 of the remainder being dead from disease. Red rot is the most important disease affecting seed cane, but during the winter of 1935–6 sheath rot (*Cytospora*) [*sacchari*: ibid., xiv, p. 348] has caused considerable deterioration of all commercial varieties, especially C.P. 807 and 28/19, and in some instances Co. 281. In cold, wet winters root rot (chiefly *Pythium* [*arrhenomanes*: ibid., xiv, p. 94]) may cause rotting of the first seed roots that develop.

SANDU-VILLE (C.). **Beitrag zur Kenntnis der Erysiphaceen Rumäniens.** [Contribution to the knowledge of the Erysiphaceae in Rumania.] —*Anal. Acad. române*, Ser. III, xi, 5, pp. 181–250, 15 pl., 1936.

This annotated list of 40 species of the Erysiphaceae which have been recorded in Rumania supplements the previous list published by Săvulescu in collaboration with the author [*R.A.M.*, ix, p. 343], bringing the total record to 65 species on 273 host plants. The fungi are classified on the lines suggested by Blumer [ibid., xiii, p. 127], with the exception that the genus *Trichocladia* is retained as valid, representing a transitional form between the genera *Erysiphe* and *Microsphaera*. Specimens of all the species contained in the two lists are preserved at the Rumanian Agricultural Research Institute, and exsiccata of a large number of the species have also been issued in the Herbarium Mycologicum Romanicum.

GOIDÀNICH (G.). **Il genere di Ascomiceti 'Grosmannia' G. Goid.** [The genus *Grosmannia* G. Goid. of the Ascomycetes.]—*Boll. Staz. Pat. veg. Roma*, N.S., xvi, 1, pp. 26–60, 1 pl., 19 figs., 1936.

In this paper an exhaustive account is given of the new genus *Grosmannia* G. Goid. recently announced by the author [*R.A.M.*, xiv, p. 703]. The perithecia are characterized as subspheroidal, bearing sparse hairs, and with a rather short, rigid beak, sometimes with hyaline cilia at the apex. The globose-ellipsoidal asci arise irregularly within the ascocarp and are diffluent when mature. The ascospores are oval, cylindrical, or slightly curved and are expelled through the beak at the apex of which they form a light opalescent drop.

The conidial stage is referred to *Scopularia* Preuss., with which *Leptographium* [ibid., xii, p. 408] is regarded as synonymous. An emended Latin diagnosis of the genus is given. The conidiophores of *Scopularia* consist of (generally) pluricellular, brown hyphae intricately branched at the apex. The conidia are borne at the extreme branches of the conidiophore in heads of 2 to 6; they are hyaline, ellipsoid, or slightly curved and are contained in a drop of mucus at the apex. Spores are also produced on simple branches; the conidia can multiply by budding.

In *Grosmannia* the author places his new species *G. serpens* with its conidial stage *S. serpens* n. sp., isolated from wood of *Pinus sylvestris*. He also transfers to it *Ceratostomella penicillata* as *G. penicillata* (Gros.) n. comb., *C. pini* as *G. pini* (Münch) n. comb., and *C. ips* as *G. ips* (Rumb.) n. comb. the imperfect stages of these being *S. penicillata* [ibid., xiv, p. 703], *S. pini* n. sp., and *S. rumboldii* n. sp., respectively. Other species included in *Scopularia* are *S. lundbergii* (Lagerb. & Melin) G. Goid. (syn. *Leptographium lundbergii*) [ibid., ix, p. 77]; *S. phycomyces* (Auersw.) Goid. (syn. *L. phycomyces*) [ibid., xii, p. 409] and *S. microspora* (Davidson) n. comb. (syn. *L. microsporum*) [ibid., xiv, p. 729]. Latin diagnoses are given of the new genera and species.

The author considers that *Grosmannia* occupies a systematic position of particular importance, inasmuch as it consists of Ascomycetes which in their perithecial stage closely resemble others belonging to neighbouring genera, but are distinctly characterized when regarded in their perithecial and imperfect stages together. The author emphasizes the necessity of considering all the stages of a fungus in arriving at its correct systematic position, and considers that systematic mycology should be based on this principle. The genus *Grosmannia* belongs to the family Plectascales Ophiostomataceae and lies midway between *Microascus* and *Ophiostoma*.

Arthur (J. C.) & Cummins (G. B.). **Philippine rusts in the Clemens collection 1923–1926. I.**—*Philipp. J. Sci.*, lix, 3, pp. 437–449, 3 pl., 1936.

This is the first instalment of an annotated list of rusts collected by Mrs. M. S. Clemens in the Philippine Islands between 1923 and 1926, inclusive. The present section embraces rusts on monocotyledonous hosts, and one species on Pinaceae, *Peridermium insulare* Syd., found on *Pinus insularis*. In all, it includes 51 species, represented by 96 collections.

Hiratsuka (N.). **A contribution to the knowledge of the rust-flora in the alpine regions of high mountains in Japan. (Contribution to the rust-flora of Eastern Asia. I.)**—*Mem. Tottori agric. Coll.*, iii, 2, pp. 125–247, 1 fig., 1935.

A fully annotated and tabulated list, supplemented by fungus and host indices and a bibliography of 81 titles, is given of 83 species of Uredinales (four new to science) occurring in the alpine regions of high mountains in South Saghalien, Hokkaido, and Honshu, of which 18 (21·69 per cent.) have also been found at similar altitudes in Switzerland [cf. *R.A.M.*, xii, p. 579]. A correlation was observed between the

lower atmospheric temperatures and the relative increase of microcyclic rusts towards the north and regions of high altitude. *Gymnosporangium nipponicum* Yamada n. sp. [with a Latin diagnosis], collected on *Juniperus chinensis* L. var. *sargentii* Henry, is characterized by minute, pulverulent, cinnamon-coloured, applanate or hemispherical sori differing from the wedge-shaped ones of the otherwise closely similar *G. haraeanum* [ibid., xiv, p. 533] on the leaves and more rarely on young branches; the diagnosis contains two descriptions of teleutospores, namely (1) ellipsoid or broadly ellipsoid, rounded at the apex and base, with one median septum, smooth, chestnut-brown 36 to 45 by 22 to 27 μ; and (2) oblong or fusiform, tapering towards the apex and base, with one median septum, smooth, pale yellow or subhyaline, 36 to 55 by 17 to 21 μ, with a very long, hyaline, cylindrical pedicel. The alternate host of the new rust is *Sorbus* [*Pyrus*] *aucuparia*.

Hiratsuka (N.) & Yoshinaga (T.). **Uredinales of Shikoku. (Contributions to the rust-flora of Eastern Asia. II.)**—*Mem. Tottori agric. Coll.*, iii, 2, pp. 249–377, 3 figs., 1 map, 1935.

This is a list, compiled on similar lines to the foregoing, of 294 species of Uredinales (including seven new ones and three new combinations) found in the province of Shikoku, Japan, where the rust flora bears some relationship to that of Europe, North America, India, Siberia, and South Saghalien.

Kamei (S.). **On Milesina itoana, sp. nov. and its peridermial stage.**—*Trans. Sapporo nat. Hist. Soc.*, xiv, 2, pp. 97–100, 1 pl., 1935. [Received 1936.]

Details are given of inoculation experiments on *Abies mayriana* needles with sporidia of *Milesina itoana* n. sp. from overwintered fronds of the fern *Dryopteris crassirhizoma*, the results of which (spermogonial and aecidial development on the former host and uredospore and teleutospore formation on the latter, after inoculation with teleutospores and aecidiospores, respectively) are considered to establish a genetic connexion between the aecidial (*Peridermium*) stage on *A. mayriana* and the teleutospore (*Milesina*) phase on *D. crassirhizoma*. Considerable damage is caused by the rust to *A. mayriana*, to which it is, in fact, more highly pathogenic than any of the other 'white' rusts (some 15 in number, including *M. miyabei* [*R.A.M.*, xi, p. 813] and *M. carpatica* [ibid., xv, p. 469]), attacking the same host. *A. sachalinensis* suffers similar injury from the rust.

A Latin diagnosis is given of *M. itoana*, which is characterized by hyaline, subspherical spermogonia, 160 to 352 μ in width by 110 to 290 μ in height (average 260 by 200 μ); oblong to cylindrical, hyaline spermatia, 5 to 6 by 1 to 1·5 μ; cylindrical or laterally compressed, white aecidia, 0·2 to 0·5 mm. in diameter, 0·2 to 2 mm. in height, with subimbricated, polygonal peridial cells, 21 to 42 by 12 to 30 μ (26 by 18 μ); globose, ovate, or ellipsoid, hyaline, verrucose aecidiospores, 20 to 38 by 14 to 29 μ (25 to 20 μ); round uredosori with hyaline, irregularly polygonal, non-imbricated peridial cells, 4 to 16 μ in diameter; obovate or oblong, smooth, hyaline uredospores, 24 to 46 by

14 to 26 μ (30 by 18 μ); and vertically septate, pluricellular, smooth, hyaline teleutospores, the cells measuring 12 to 16 by 7 to 14 μ.

Ito (S.). **Notae mycologicae Asiae orientalis. II.** [Mycological notes from Eastern Asia. II.]—*Trans. Sapporo nat. Hist. Soc.*, xiv, 2, pp. 87–96, 1935. [Received 1936.]

Latin diagnoses are given of 24 fungi which are either new species, new combinations, or have hitherto been described only in Japanese [cf. *R.A.M.*, xv, p. 57]; the remaining eight new combinations are furnished with taxonomic, bibliographical, and geographical notes. *Ustilago kenjiana* n. sp., characterized by globose or ellipsoid, brown, echinulate spores, 4 to 7·6 μ in diameter (average 5 μ), produces subglobose or oblong, brownish-black, powdery sori, 3 to 6 mm. in diameter, covered with a light brown membrane, in the ovaries of sorghum in Manchuria. It differs from the closely related *U. bulgarica* [ibid., xii, p. 617] in its smaller spores and pulverulent sori, and from *Sphacelotheca sorghi* in its smaller spores and the absence of a columella.

U. tanakae n. sp. forms compact, black, covered sori, scarcely visible between the glumes, in the ovaries of *Setaria italica* var. *germanica* in Hokkaido. Its globose to angular or occasionally ellipsoid, brownish-black, verrucose spores measure 8 to 15 μ in diameter.

Sorghum ovaries and pedicels in Honshu are liable to invasion by *Sorosporium andropogonis-sorghi* n. sp., characterized by powdery, brownish-black sori, 5 to 15 mm. long, a columella surrounded by the disorganized cellulose of the glume tissues, and globose or ellipsoid, brown spores, 9·6 to 13·5 μ in diameter, sometimes with one or two hyphae united above the spore. This species differs from the related *S.* [*Tolyposporium*] *ehrenbergii* [ibid., xiii, p. 746] in the presence of numerous twisted fibres in its sori.

S. manchuricum n. sp. (*S. panici-miliacei* Takahashi p.p.), infecting the ears of *Panicum miliaceum* in Hokkaido, Honshu, and Manchuria, is characterized by masses of black, fusiform, erumpent sori, glomerules of variable shape, globose or ellipsoid 150 μ in diameter, ovoid 320 by 220 μ, or cylindrical 70 to 170 by 16 to 30 μ, and globose or ellipsoid, brown, smooth spores, 6 to 8 μ in diameter, occasionally up to 13 μ long.

U. paspali-thunbergii P. Henn. (*S. paspali* McAlp.), attacking the ears of *Paspalum thunbergii* Kunth. and *P. scrobiculatum* L. [ibid., ix, pp. 431, 775] is re-named *S. paspali-thunbergii* (P. Henn.) S. Ito n. comb.

Săvulescu (T.). **Contribution à la connaissance des Ustilaginées de Roumanie.** [Contribution to the knowledge of the Ustilaginales of Rumania.]—*Anal. Inst. Cerc. agron. Român.*, vii (*1935*), pp. 347–430, 35 pl., 1 map, 3 graphs, [? 1935. Received October, 1936.]

This is a copiously annotated list of 75 species belonging to 13 genera of the Ustilaginales which have been so far recorded on 84 different cultivated and wild host plants in Rumania, including one new species and one new specialized form. Exsiccata of most of the species have been issued in the Herbarium Mycologicum Romanicum. The world distribution of certain of the species described is indicated in a special table.

MUNDKUR (B. B.). **On the systematic position of the smut causing malformation of Vitis quadrangularis.**—*Indian J. agric. Sci.*, vi 3, pp. 876–887, 1936.

The smut described by Iyengar and Narasimhan (*Phytopathology* xii, p. 435, 1922) under the name of *Schizonella colemani* as causing a witches' broom of *Vitis quadrangularis* in Madras has been compared by the writer with herbarium material of the earlier *Mycosyrinx arabica* (Henn.) Penzig, collected by W. McRae on the same host in Madras in 1911 and identified by Sydow in 1914 (*Ann. mycol., Berl.*, xii, p. 487), and found to be identical with the latter.

ROGER (L.). **Quelques champignons exotiques nouveaux ou peu connus. II.** [Some new or little known exotic fungi.]—*Bull. Soc. mycol. Fr.*, lii, 1, pp. 80–84, 2 figs., 1936.

Continuing his earlier studies [*R.A.M.*, xiv, p. 396] the author gives notes, with technical descriptions, on four fungi from Africa and South America. *Helminthosporium lycopersici* Maublanc & Roger n. sp., found on tomato leaves at La Mé, Ivory Coast, is characterized by brown, short conidiophores bearing light brown, sometimes very pale, 7- to 14-septate conidia measuring 90 to 200 by 10 to 18 μ. The fungus occurred on lesions caused by a *Cercospora*, thought to be *C. canescens* [ibid., xiv, p. 87]. This is stated to be the first record of a *Helminthosporium* on tomato. *Coniothyriella theobromae* n. sp. was found on cacao pods, probably saprophytic, at Bingerville, Ivory Coast.

CASTELLANI (E.). **Ricerche preliminari sulla biologia di alcune Rizottonie.** [Preliminary researches on the biology of some species of *Rhizoctonia*.]—*Ann. Ist. sup.* (*agr.*) *for. naz.*, Ser. II, v, pp. 29–61, 2 pl., 16 graphs, 1935. [Received August, 1936.]

This paper on certain species of *Rhizoctonia* which are weak parasites of the roots of various plants is an expanded version in Italian of one already noticed from another source [*R.A.M.*, xiii, p. 597]. *R. callae*, belonging to the second, less virulent group of species, was obtained from *Calla* [*Zantedeschia*] *aethiopica*. Its optimum temperature for growth was 20° C., its optimum hydrogen-ion concentration was P_H 7·4, the maximum P_H 3·4 to 4·0, and the final P_H 7·7. Its virulence was limited.

CASTELLANI (E.). **Ricerche morfologico-sistematiche su alcune Rizottonie.** [Morphological and systematic researches on some species of *Rhizoctonia*.]—*Ann. Ist. sup.* (*agr.*) *for. naz.*, Ser. II, v, pp. 65–77, 6 pl., 7 figs., 1935. [Received August, 1936.]

In this expanded version of his earlier paper the author gives full technical descriptions [but no Latin diagnoses] of eight strains of *Rhizoctonia* isolated from the roots of various plants in Italy [*R.A.M.*, xiii, p. 598 and preceding abstract]; *R. solani* var. *cedri deodarae* [? n.var.] from deodar differs from the type in the less strong pigmentation, in the smaller and fewer sclerotia (up to 16 as against 20 mm.), and general appearance. *R. lupini* n. sp. is characterized by an ochraceous-yellow, later dark chestnut mycelium, with cells 50 to 65 by 7 μ, branching at right angles, with barrel-shaped cells (pseudoconidia) 30 by 12·5 μ, and sparse sclerotia 5 to 8 mm. in diameter and produced

only at rather high temperatures. *R. fraxini* n. sp. showed a dark, abundant, cottony mycelium with cells 24 to 60 (mostly 40 to 50) by 3·5 μ in diameter, and the angle of branching tending to be acute, with pseudoconidia 27 by 12 μ, sometimes dichotomously dividing, with subglobose, fulvous-violaceous to reddish-brown sclerotia 2 to 3 mm. in diameter, rough at the edges. *R. alpina* n. sp. has an abundant white, cottony mycelium with cells 72 to 108 (mostly 90 to 100) by 6 μ and numerous white, later faintly lemon-yellow sclerotia, 1 to 1·5 mm. in diameter, which develop in compact masses; the round pseudoconidia measure 24 by 17 μ. *R. pini-insignis* n. sp. shows a white mycelium with cells 22 to 67 (mostly 50) by 3 to 6 μ; the hyphae measure 3 to 6 μ in diameter, the pseudoconidia 25 to 30 by 6 to 7 μ, and the sclerotia 1 to 1·5 mm. in diameter. *R. callae* n. sp. has a white, cottony mycelium with cells 44 to 60 by 4 μ, sclerotia 0·6 to 1·5 mm. in diameter, and pseudoconidia 18 to 24 by 12 to 16 μ. *R. quercus* n. sp. is characterized by white, later ochraceous mycelium, with cells 130 to 140 by 4 to 6 μ, pseudoconidia measuring 22 to 28 by 10 to 12 μ, and sclerotia 0·3 to 0·8 mm. in diameter.

PRICE (W. C.). **Specificity of acquired immunity from Tobacco-ring-spot diseases.**—*Phytopathology*, xxvi, 7, pp. 665–675, 3 figs., 1936.

A systemic virus disease of tobacco, designated as ring spot No. 2 and characterized by the production on Turkish tobacco foliage of zonate necrotic spots, was shown by means of the immune reaction to be entirely distinct from ordinary ring spot (No. 1) [*R.A.M.*, xv, p. 751] and from the green and yellow forms of this disease. Tobacco plants infected by ring spot No. 2, which is transmissible by leaf rubbing to *Nicotiana glutinosa*, *N. sylvestris*, *N. langsdorffii*, tomato, bean (*Phaseolus vulgaris*), and cowpea, recover and acquire a solid immunity from the disturbance, but not from ring spot No. 1 or from any of the other eleven virus disorders tested. Ring spot No. 1 and green ring spot give complete protection against each other, but neither confers absolute immunity from the yellow type [ibid., xv, p. 614]; the last-named, however, protects against ring spot No. 1 and the green form, indicating a close relationship between these three viruses. Ring spot No. 1, green ring spot, and yellow ring spot do not protect tobacco against infection by the tobacco, aucuba, cucumber, or celery mosaic, potato veinbanding, potato ring spot, spotted wilt, etch, or severe etch viruses. These data are considered to demonstrate the specificity of acquired immunity from diseases of the tobacco ring spot group.

Destructive Insect and Pest Acts, England. The Fruit Tree Pests (Huntingdonshire, East and West Suffolk, and West Sussex) Orders of 1936. Nos. 129, 622, and 875 of 1936.—12 pp., 1936.

These orders, effective from 22nd February, 27th May, and 4th September, 1936, respectively, are on similar lines to those already issued to other local authorities [*R.A.M.*, xv, p. 272].

Legislative and administrative measures.—*Int. Bull. Pl. Prot.*, x, 7, pp. 153–155, 157–159, 1936.

AUSTRALIA (COMMONWEALTH OF). Quarantine 9P of 11th September,

1935 [cf. *R.A.M.*, xv, p. 688] specifically prohibits the importation of all stone fruit trees or parts thereof from countries (or any individual State of the United States of America) harbouring the diseases known as peach yellows [ibid., xv, pp. 688, 730], rosette, little peach, and phony [ibid., xv, p. 335]; all gooseberry plants or parts thereof from any country in which *Sphaerotheca mors-uvae* occurs; all plants or parts thereof, including fruits or seeds (other than manufactured products), liable to infection by any species of *Hemileia* from any country in which the latter exists; *Humulus* plants (except the dried flower cones commercially known as 'hops') grown in any country harbouring either *Pseudoperonospora humuli* or mosaic; citrus (tribe Citrinae only) plants (including the fruits but exempting the seeds) from any country in which *Pseudomonas citri* [cf. ibid., xiv, pp. 64, 564; xv, p. 64] occurs; all plants or parts thereof (including the fruits but exempting the seeds) of the family Rosaceae from any country in which *Bacillus amylovorus* exists.

Latvia. New regulations for the phytosanitary control of Latvian nursery-gardens authorize the inspection of the nurseries at least twice annually by experts who are empowered to order the destruction of apple, pear, plum, and cherry trees infected by various common pathogens.

Rumania. The Chief of the Rumanian Plant Protection Service announces that, for a period of five years commencing on 5th May, 1936, no young plants or seeds of *Pinus strobus*, *P. lambertiana*, *P. flexilis*, *P. monticola*, and *P. cembra* var. *sibirica* are to be introduced into the country, with a view to preventing the spread of *Cronartium ribicola*. The entire stocks of plants of these species in infested nurseries will be burnt and their further cultivation during the legislative period is prohibited.

Legislative and administrative measures.—*Int. Bull. Pl. Prot.*, x, 8, pp. 174–175, 178, 1936.

Australia (Commonwealth of). A modification (Quarantine Proclamation No. 14P of 25th March, 1936) of Quarantine Proclamation No. 9P [see preceding abstract] permits the importation into Australia of apples from districts of New Zealand free from fire blight (*Bacillus amylovorus*) [*R.A.M.*, xiii, p. 707], subject to the conditions prescribed in the Regulations.

Italy. In order to prevent the spread of 'mal secco' disease of citrus (*Deuterophoma tracheiphila*) [see above, p. 774], a Ministerial Decree of 29th May, 1936, prohibits the export from Sicily of lemon, grapefruit, and citron plants and parts thereof.

Gesetze und Verordnungen. [Laws and ordinances.]—*NachrBl. dtsch. PflSchDienst*, xvi, 5, p. 55, 1936.

Germany. An Ordinance of the Corporation of Horticulture and Viticulture, dated 22nd April, 1936, and effective from that day prohibits the cultivation in nurseries and horticultural establishments of all the grey or blue forms (var. *glauca*) of *Pseudotsuga taxifolia* with a view to arresting the spread of needle fall [*Rhabdocline pseudotsugae*: *R.A.M.*, xiv, p. 483; xv, p. 608].

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